

JVC

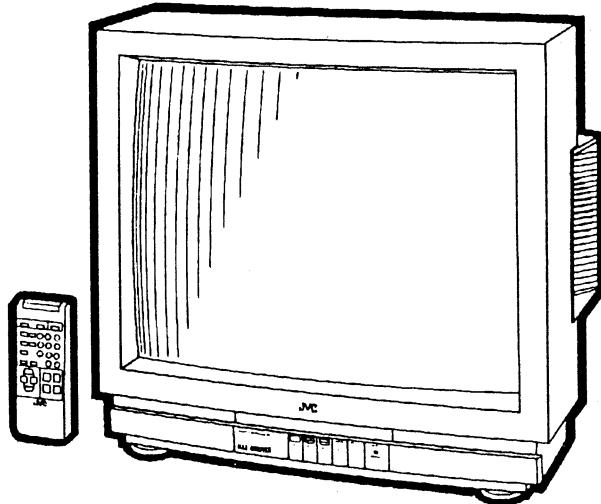
SERVICE MANUAL

26" COLOR MONITOR / RECEIVER

AV-2649S_(us)

BASIC CHASSIS

FXIII



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SPECIFICATIONS

Item	Content
Dimensions	65.6cm (W) × 51.7cm (D) × 58.1cm (H)
Weight	34.5kg
TV System and Color system	
TV RF System	CCIR (M)
Color System	NTSC, BTSC (Multichannel Sound)
TV Receiving Channels and Frequency	
VL Band	(02 ~ 06) 54MHz ~ 88MHz
VH Band	(07 ~ 13) 174MHz ~ 216MHz
UHF Band	(14 ~ 69) 470MHz ~ 806MHz
CATV Receiving Channels and Frequency (Quartz Synthesizer system)	
Low Band	(02 ~ 06, A-8) by (02 ~ 06&01)
High Band	(07 ~ 13) by (07 ~ 13)
Mid Band	(A ~ 1) by (14~22)
Super Band	(J~W) by (23~36)
Hyper Band	(W+1 ~ W+28) by (37 ~ 64)
ULTRA Band	(W+29 ~ W+84) by (65 ~ 125)
Sub Mid Band	(A4 ~ A1) by (96 ~ 99)
} (54MHz ~ 804MHz)	
TV/CATV Total Channel	180 Channels
Intermediate Frequency	
Video IF Carrier	45.75MHz
Sound IF Carrier	41.25MHz (4.5MHz)
Color Cub Carrier	3.58MHz
Antenna Input Impedance	75Ω UHF VHF in common (F-Type)
Power Input	120V AC, 60Hz
Power Consumption	135W (max.), 98W (avg.)
Picture Tube	26" In-Line Type Full-Square Tube
Viewable Picture Size	52.8cm (W) × 39.6cm (H)
High Voltage	28kV ± 1kV (at zero beam current)
Speaker	8 × 12cm Oval Type, 8Ω × 2
Audio Power Output	2.2W + 2.2W
Video External Input	1 Vp-p 75Ω
Audio External Input	500mV rms (- 4dBs), High Impedance
Video Line Output	1 Vp-p 75Ω
Audio Line Output	500mV rms (- 4dBs)
S-VIDEO IN	Low Impedance (400Hz, 100% modu.) Y: 1 Vp-p Positive, 75Ω (negative sync. provided) C: 0.286 Vp-p(burst signal), 75Ω
Variable Audio Output	More than 0~1000mV rms (+ 2.2dBs) Low Impedance (400Hz, 100% modu.)
Tube	1
IC	14 (In TV), 1 (In Remocon)
Transistor	52 (In TV), 2 (In Remocon)

Design & specification subject to change without notice.

SAFETY PRECAUTIONS

- The design of this product contains special hardware, many circuits and components specially for safety purposes. For continued protection, no changes should be made to the original design unless authorized in writing by the manufacturer. Replacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.
- Alterations of the design or circuitry of the products should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.
- Many electrical and mechanical parts in the products have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the parts list of Service manual. Electrical components having such features are identified by shading on the schematics and by (Δ) on the parts list in Service manual. The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list of Service manual many create shock, fire, or other hazards.
- Use isolation transformer when hot chassis.**
The chassis and any sub-chassis contained in some products are connected to one side of the AC power line. An isolation transformer of adequate capacity should be inserted between the product and the AC power supply point while performing any service on some products when the HOT chassis is exposed.
- Don't short between the LIVE side ground and NEUTRAL side grounding or EARTH side ground when repairing.**
Some model's power circuit is partly different in the GND. The difference of the GND is shown by the LIVE (L) side GND, the NEUTRAL (N) side GND and EARTH (E) side GND. Don't short between the LIVE side GND and NEUTRAL side GND or EARTH side GND and never measure with a measuring apparatus (oscilloscope etc.) the LIVE side GND and NEUTRAL side GND or EARTH side GND at the same time.
If above note will not be kept, a fuse or any parts will be broken.
- If any repair has been made to the chassis, it is recommended that the B₁ setting should be checked or adjusted (See ADJUSTMENT OF B₁ POWER SUPPLY).
- The high voltage applied to the picture tube must conform with that specified in Service manual. Excessive high voltage can cause an increase in X-Ray emission, arcing and possible component damage, therefore operation under excessive high voltage conditions should be kept to a minimum, or should be prevented. If severe arcing occurs, remove the AC power immediately and determine the cause by visual inspection (incorrect installation, cracked or melted high voltage harness, poor soldering, etc.). To maintain the proper minimum level of soft X-Ray emission, components in the high voltage circuitry including the picture tube must be the exact replacements or alternatives approved by the manufacturer of the complete product.
- Do not check high voltage by drawing an arc. Use a high voltage meter or a high voltage probe with a VTVM. Discharge the picture tube before attempting meter connection, by connecting a clip lead to the ground frame and connecting the other end of the lead through a 10k Ω 2W resistor to the anode button.
- When service is required, observe the original lead dress. Extra precaution should be given to assure correct lead dress in the high voltage circuit area. Where a short circuit has occurred, those components that indicate evidence of overheating should be replaced. Always use the manufacturer's replacement components.
- Isolation Check**
(Safety for Electrical Shock Hazard)
After re-assembling the product, always perform an isolation check

on the exposed metal parts of the cabinet (antenna terminals, video/audio input and output terminals, Control knobs, metal cabinet, screwheads, earphone jack, control shafts, etc.) to be sure the product is safe to operate without danger of electrical shock.

(1) Dielectric Strength Test

The isolation between the AC primary circuit and all metal parts exposed to the user, particularly any exposed metal part having a return path to the chassis should withstand a voltage of 1100V AC (r.m.s.) for a period of one second.

(. . . Withstand a voltage of 1100V AC (r.m.s.) to an appliance rated up to 120V, and 3000V AC (r.m.s.) to an appliance rated 200V or more, for a period of one second.)

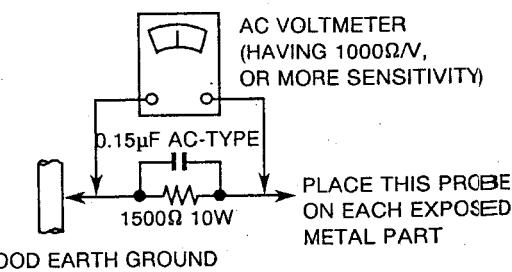
This method of test requires a test equipment not generally found in the service trade.

(2) Leakage Current Check

Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.) Using a "Leakage Current Tester", measure the leakage current from each exposed metal part of the cabinet, particularly any exposed metal part having a return path to the chassis, to a known good earth ground (water pipe, etc.). Any leakage current must not exceed 0.5mA AC (r.m.s.).

• Alternate Check Method

Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.). Use an AC voltmeter having 1,000 ohms per volt or more sensitivity in the following manner. Connect a 1,500 Ω 10W resistor paralleled by a 0.15 μ F AC-type capacitor between an exposed metal part and a known good earth ground (water pipe, etc.). Measure the AC voltage across the resistor with the AC voltmeter. Move the resistor connection to each exposed metal part, particularly any exposed metal part having a return path to the chassis, and measure the AC voltage across the resistor. Now, reverse the plug in the AC outlet and repeat each measurement. Any voltage measured must not exceed 0.35V AC (r.m.s.). This corresponds to 0.5mA AC (r.m.s.).



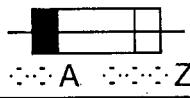
11. High voltage hold down circuit check.

After repair of the high voltage hold down circuit, this circuit shall be checked to operate correctly.

See item "How to check the high voltage hold down circuit".

■ ONLY CANADA

This mark shows a fast operating fuse, the letters indicated below show the rating.

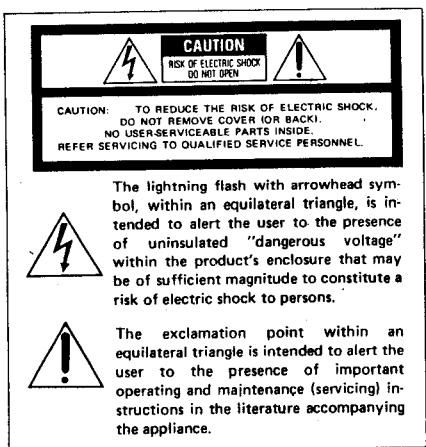


FEATURES

OPERATING INSTRUCTIONS

- New chassis design enables use of a single board with simplified circuitry.
- Provided with miniature tuner (TV/CATV).
- PLL synthesizer system TV/CATV totaling 180 channels.
- Deletion of user VR by master command and increased features possible simultaneously.
- Multifunctional remote control permits picture adjustment.
- Adoption of the CHANNEL GUARD function prevents the specific channels from being selected, unless the "ID number" is key in.
- On-screen clock display function.
- On-screen control, select display function.
- Built-in MTS circuit compatible with AV system.
- S-video input terminal.
- Variable audio output terminal.

SAFETY PRECAUTION



WARNING:
TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS TV SET TO RAIN OR MOISTURE.

CAUTION: TO INSURE PERSONAL SAFETY, OBSERVE THE FOLLOWING RULES REGARDING THE USE OF THIS UNIT.

1. Operate only from the power source specified on the unit.
2. Avoid damaging the AC plug and power cord.
3. Avoid improper installation and never position the unit where good ventilation is unattainable.
4. Do not allow objects or liquid into the cabinet openings.
5. In the event of trouble, unplug the unit and call a service technician. Do not attempt to repair it yourself or remove the rear cover.

Caution:
When you do not use this TV set for a long period of time, be sure to disconnect the power plug from the AC outlet for your safety. If the TV set is plugged into an AC outlet, a small amount of current is applied to the TV set even if the TV set's power is turned off.

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Thank you for purchasing a JVC color monitor/receiver (TV). Your JVC TV carries many useful features including the MASTER COMMAND *III* system which allows operation of all TV functions via a single remote control unit.

To ensure your complete understanding, please read all instructions in this booklet before operation.

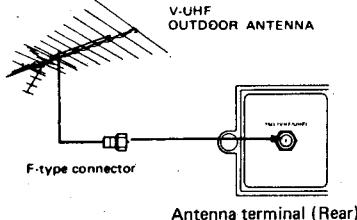
FEATURES

- 26-Inch FS (Full-Square) picture tube.
- Comb filter for improved picture quality.
- 180-Channel cable-compatible frequency synthesizer tuner with built-in MTS decoder.
- S-VIDEO input terminal for taking best advantage of Super VHS.
- Video/audio input, line output and variable audio output terminals.
- MASTER COMMAND *III* remote control with multi-color on-screen "Menu" display, allowing interactive, total TV operation.

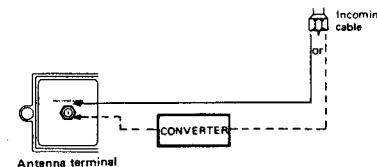
INSTALLATION

ANTENNA CONNECTIONS

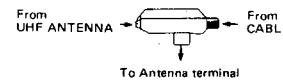
An outdoor antenna is recommended for good TV picture reception. (For installation of the outdoor antenna system, consult your local dealer.)



CABLE TV CONNECTIONS



- Some cable companies require a converter box to receive all available programs. Others may require it for subscription or "premium" programming. Consult your local cable company for correct installation.
- When connecting both a cable (75-ohm coaxial) and a UHF antenna (300-ohm feeder), use the optional antenna mixer (CE41467) to make a single connection.

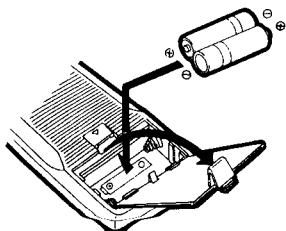


Note: With this antenna mixer, reception of cable channels higher than "Channel W + 17" is not possible.

REMOTE CONTROL USE

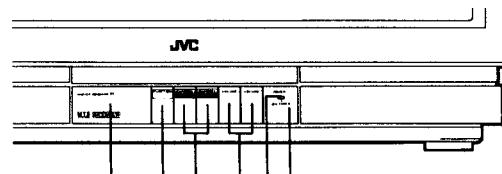
Correct Use

- Point to the Remote Control Sensor ① of the TV set.
- The maximum operable distance is approximately 23 ft from the Remote Control Sensor, and no more than 30° to either side of center.
- Operation of the Remote Control is most effective when there is nothing between it and the Remote Control Sensor.
- Duration of the batteries is approximately 6 months to 1 year. (Duration varies according to frequency of use.) Replace the batteries when the remote operation becomes unstable.
- Battery Installation/Notes
 - Press the tab and lift up the cover in the direction of the arrow.
 - Correctly install the batteries, observing (+/-) polarities as shown.
 - Do not use a combination of old and new batteries or batteries of different types.
 - If batteries become exhausted, remove and replace them soon.
 - If Remote Control will not be used for more than 2 weeks, remove batteries.
 - When battery leakage occurs, clean the battery compartment with a soft cloth and replace the batteries.

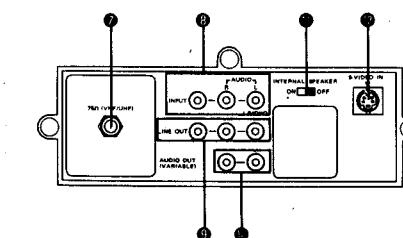


CONTROLS AND THEIR LOCATIONS

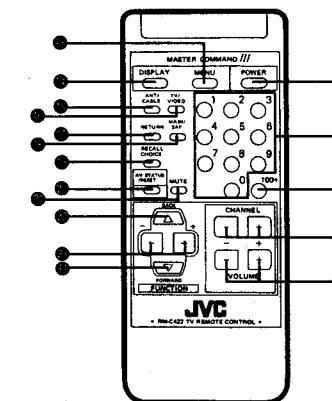
Front Panel Control Section



Rear Panel Control Section



Remote Control Section



① POWER button	⑧ VIDEO/AUDIO INPUT connectors	⑮ MENU button	⑮ MUTE button
② POWER/ON TIMER indicator	⑨ LINE OUT connectors	⑯ DISPLAY button	⑯ FUNCTION BACK button
③ VOLUME (-/+) buttons	⑩ AUDIO OUT (VARIABLE) connectors	⑰ ANT/CABLE button	⑰ FUNCTION (-/+) buttons
④ CHANNEL/LEVEL (-/+) buttons	⑪ INTERNAL SPEAKER switch (ON/OFF)	⑱ TV/VIDEO button	⑱ FUNCTION FORWARD button
⑤ FUNCTION button	⑫ S-VIDEO IN connector	⑲ RETURN button	⑲ 10-Digit Keypad
⑥ Remote Control Sensor		⑳ MAIN/SAP button	⑳ 100+ button
⑦ Antenna terminal		⑳ RECALL CHOICE button	⑳ CHANNEL (-/+) buttons
		⑳ AV STATUS/RESET button	

*Please refer to the above numbers on the following pages.

TV OPERATION

First Preparations

- Connect either Antenna or Cable TV by following "Installation" instructions on page 3.
- Insert batteries into the Remote Control unit by following "Remote Control Use" instructions on page 3.
- Connect the power cord to 120 V, 60 Hz AC outlet. The power cord is supplied with a polarized plug. Therefore, it will only insert one way into the wall outlet. DO NOT DEFEAT THE POLARIZED PLUG. If you have difficulty, consult your local dealer.

Basic Operating Procedure

- Press POWER button ① on either the Remote Control or front panel. POWER/ON TIMER indicator ② lights. Press this button again to turn power off.
- Press TV/VIDEO button ③ on the Remote Control (or FUNCTION and CHANNEL/LEVEL (-/+) buttons on the front panel) to select the TV mode.

Note: If POWER/ON TIMER indicator remains lit even after the power is turned off, it shows the ON TIMER is in operation. See "5. SET ON TIMER" on page 11 and "7. HOMESITTER" on page 12.

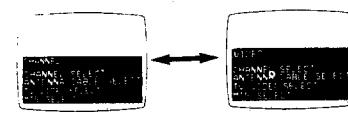
2 ANTENNA/CABLE SELECT (broadcast) mode

In this mode, press CHANNEL/LEVEL (-/+) buttons ④ on the front panel to change the broadcast mode between "CHANNEL" (for regular VHF/UHF channels) and "CABLE" (for cable channels).

**3 TV/VIDEO SELECT mode**

In this mode, press CHANNEL/LEVEL (-/+) buttons ④ on the front panel to switch the mode between "TV" (for off-air or cable TV broadcasts) and "VIDEO" (for video source which is connected to the TV set's VIDEO/AUDIO INPUT connectors ⑩ or S-VIDEO IN connector ⑪). See "CONNECTING TO EXTERNAL EQUIPMENT" on page 18.

Note: Mode selection can be performed with TV/VIDEO button ⑫ on the Remote Control.

**4 MTS SELECT mode**

Your TV set incorporates an MTS (Multichannel Television Sound) decoder to receive stereo broadcasts and any accompanying SAP (Second Audio Program), such as a bilingual broadcast.

Available sound will be:

- (1) Monaural (MAIN) audio program (regular broadcasts)
- (2) STEREO (MAIN) audio program
- (3) Second Audio Program (SAP)

In this mode, the "← ON AIR" shows which MTS mode is now being broadcast. Press CHANNEL/LEVEL (-/+) buttons ④ to change the reception mode among "STEREO", "SAP" and "MONO".

Each time it is pressed, the color of the indication changes from blue to magenta to show that the mode has just been switched.

**Notes:**

- Mode selection can be performed with MAIN/SAP button ⑫. Each time it is pressed, the mode changes in the order of "STEREO" → "SAP" → "MONO" → "STEREO".
- If the TV set is kept always set to the stereo mode, when a stereo broadcast is received, stereo sound is output automatically.
- If the received stereo signal is weak, noise may be heard. In such a case, press CHANNEL/LEVEL (-/+) buttons ④ (or MAIN/SAP button ⑫) to engage the MONO mode for better sound reception.

- If the received SAP signal is weak, the SAP will not be heard. Select the MONO mode for better sound reception.
- Even if both stereo and SAP broadcasts are received, both broadcasts cannot be heard at a time.

When using the TV set for cable reception

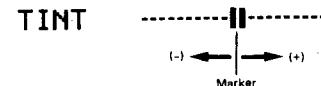
Transmission of Cable TV signals may differ from off-air TV broadcasts. It is possible that the multichannel TV sound (MTS) may not be received satisfactorily.

5-12 Picture/sound adjustment modes

In these modes, an adjustment scale with a marker appears on the screen. Press CHANNEL/LEVEL (-/+) buttons ④ on the front panel or FUNCTION (-/+) buttons ⑪ on the Remote Control to fine adjust each item to your preference according to the chart below. (The center position is only a reference level, rather than a standard setting.)

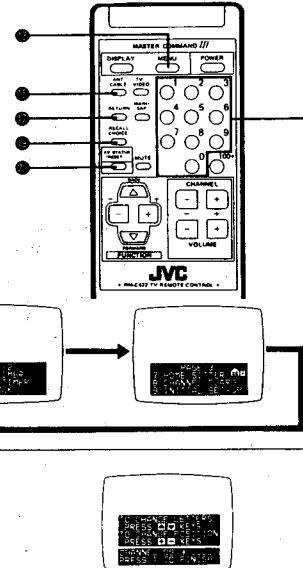
(-)	ITEM	(+)
Reddish	TINT	Greenish
Subdued	COLOR	Vivid
Light	PICTURE	Strong
Dark	BRIGHT	Bright
Soft	DETAIL	Sharp
Soft	BASS	Strong
Soft	TREBLE	Strong
Left	BALANCE	Right

Note: When you wish to restore all adjustment modes to their scale's center position, use AV STATUS/RESET button ⑪. For details, see "AV STATUS/RESET button" on page 10.

**MENU BUTTON**

The "MENU" button selects a list of functions that can be programmed for operating the TV more conveniently. This function is possible only on the Remote Control.

- Press MENU button ⑪ on the Remote Control to display the list of programmable convenience functions on the screen. The "MENU" consists of 3 pages. Press the MENU button repeatedly to display the pages in the sequence below.
- Press numbers "1" through "9" on 10-Digit Keypad ⑪ to select the corresponding function in the numbered "MENU".

**PAGE-1****1. CHOICE PROGRAMMING**

This function enables storing up to 5 frequently-viewed channels as "CHOICE channels", allowing immediate, direct access to the channel you wish to preset using the RECALL CHOICE button ⑪.

- 1) While in the channel select mode (either "CHANNEL" or "CABLE" mode), determine the channel you wish to preset as a CHOICE channel and display it on the screen. (For example, press "0" and "9" to display "CHANNEL 09".)

- 2) With "PAGE-1" MENU displayed on the screen, press "1" of 10-Digit Keypad ⑪.

The display will show:

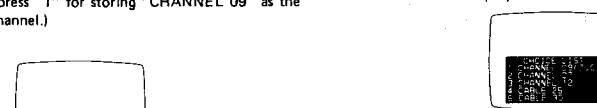


- 3) Press a number (1 – 5) on 10-Digit Keypad ⑪ for the CHOICE channel number you wish to preset. Then, the following display will appear.

(For example, press "1" for storing "CHANNEL 09" as the "CHOICE 1" channel.)



- 4) With this display, you can store the TV station's call letters for handy reference along with its channel number. (Up to 4 letters can be stored.) If you choose to store the call letters, press "1". The following display will appear.



- 6) Repeat steps 1) through 5) to preset up to 5 CHOICE channels.

RECALL CHOICE Button

- Simply press RECALL CHOICE button ⑪ anytime you want to call up the list of preset CHOICE channels for convenient direct CHOICE channel selection.

While the list is on the screen, press the corresponding number of 10-Digit Keypad ⑪ to select the preferred channel.

2. CHANNEL SCAN

This feature allows automatic scanning, in ascending order, of the channels which have been stored following the procedures of "9. INITIAL SET-UP" (described on page 15).

1) With "PAGE-1" MENU displayed on the screen, press "2" of 10-Digit Keypad ●.

- All memorized channels (either "CHANNEL" or "CABLE" mode) will now be scanned sequentially in ascending order beginning with the channel that the TV is tuned to. Scanning will stop automatically when the original channel is reached. "SCAN STOP" appears to show the CHANNEL SCAN mode has finished.



3. SET-UP AV STATUS

Your TV set incorporates the AV STATUS memory that can store 2 variations for preset picture/sound adjustments, allowing you to change the picture/sound tone/speaker balance to your preference, depending on each source.

1) With "PAGE-1" MENU displayed on the screen, press "3" of 10-Digit Keypad ●. The display will show:



2) Make picture adjustments to your preference. Use the FUNCTION BACK/FORWARD buttons to select the item, and use FUNCTION (-/+ buttons to adjust each item. If you also wish to make sound adjustments, press "1" to advance the adjustment mode display. The following display will appear. (Press "1" again to return to the picture adjustment display.)



3) Make sound adjustments to your preference. Use the FUNCTION BACK/FORWARD buttons to select the item, and use FUNCTION (-/+ buttons to adjust each item. When finished, press "2". The following display will appear.



2) Press any button on the Remote Control, if you wish to stop scanning at a certain channel before the original channel is reached.

To resume scanning, press MENU button ● and then "2" of 10-Digit Keypad ●.

Notes:

- When the TV is in the "CABLE" mode, the "CABLE" indication appears on the screen instead of "CHANNEL".
- For changing memorized channels, see "9. INITIAL SET-UP".
- If you wish to start CHANNEL SCAN at a specific channel, first select the broadcast mode (CHANNEL or CABLE) then that channel number, and then follow instructions on the left.
- While actual CHANNEL SCAN is being performed, all front panel buttons become inoperable.

AV STATUS/RESET button

Use this button for choosing the preset AV STATUS or for resetting the picture/sound adjustment items.

Press AV STATUS/RESET button ● on the Remote Control. The following display appears.



- Another pressing of the AV STATUS/RESET button resets all previously adjusted items to their center positions.

1. AV STATUS A

Press "1" of 10-Digit Keypad ● for selecting AV STATUS A. The picture and sound change as preset for "AV STATUS A". Then the picture and sound adjustment settings (items and their reference scales) appear for a few seconds each.

PAGE-2

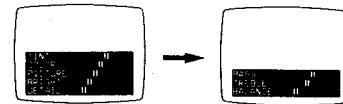
4. SLEEP TIMER

The "SLEEP TIMER" feature allows you to turn off your TV automatically at a preset time.

1) With "PAGE-2" (or "PAGE-1" or "PAGE-3") MENU displayed on the screen, press "4" of 10-Digit Keypad ●. The display will show:



4) Press "1" to store the setting as the "AV STATUS A". (Press "2" to store it as the "AV STATUS B".) Then the picture and sound adjustment settings (items and their reference scales) appear for a few seconds each.



5) Repeat steps 1) through 4) for making another AV STATUS setting.

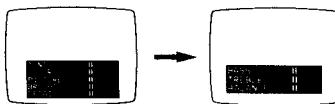
Notes: When you wish to choose the preset AV STATUS, just press the AV STATUS/RESET button ● to choose either set of AV STATUS adjustments. For details, see "AV STATUS/RESET Button" on the next page.

2. AV STATUS B

Press "2" for selecting AV STATUS B. The picture and sound change as preset for "AV STATUS B". Then the picture and sound adjustment settings (items and their reference scales) appear for a few seconds each.

3. RESET

Press "3" when you wish to reset all adjusted items (TINT, COLOR, PICTURE, BRIGHT, DETAIL, BASS, TREBLE and BALANCE) back to their center positions at the same time. The on-screen displays appear and change as follows.



Note: While in this mode, the setting of the AV STATUS cannot be cancelled.

2) Press the numbers on the 10-Digit Keypad to set the desired switch-off time. The SLEEP TIMER can be set for up to 11 hours 59 minutes from the current time.

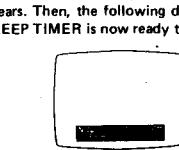
For example, if it is now 7:00 PM, and you want the TV to switch off automatically at 9:00 PM, press "9", "0" and "0". (The "AM/PM" setting is done automatically.) The selected time of "9:00 PM" appears.

• When you select "1" for hour setting (for example, "1:05 AM"), remember to press "0" first, then press "1", "0" and "5".

3) To cancel the SLEEP TIMER setting, key in the current time. (The current time setting of the TV's built-in clock.)

Notes:

- If an invalid time is selected (for example: "5:87"), it will be rejected and the SLEEP TIMER must be reset properly.
- While the SLEEP TIMER is activated, if the POWER button is pressed to turn the power off and on again, the SLEEP TIMER will be cancelled.
- While the SLEEP TIMER is activated, if the power is disconnected (such as in the case of power failure, etc.) and re-applied later, the TV is turned off. When disconnected only for a couple of minutes, the SLEEP TIMER is reactivated; however, it turns the TV off later than the set time by the amount of time of interruption.
- The SLEEP TIMER may turn off the TV a little earlier than the preset time.
- When the remaining time reaches 1 minute, the message, "GOOD NIGHT", will be displayed and continue to blink until the power turns off automatically.



Press "1" (YES) of the 10-Digit Keypad to adjust the clock. (If "2" (NO) is pressed, the warning message "YOU CANNOT OPERATE SLEEP TIMER!" is displayed.)

Set the built-in clock. (See "6. SET CLOCK" on page 12 for details.) When the clock is adjusted, the message "THANK YOU" appears. Then, the following display appears to show that the SLEEP TIMER is now ready to be set.



5. SET ON TIMER

The "ON TIMER" feature allows you to turn on your TV automatically at a preset time and on a specific channel. The ON TIMER is available for 2 different settings.

With "PAGE-2" (or "PAGE-1" or "PAGE-3") MENU displayed on the screen, press "5" of 10-Digit Keypad . The display will show:



- At this time, if the display of "POWER INTERRUPTED/ WOULD YOU SET CLOCK FIRST?" (which may appear during the SLEEP TIMER procedure) appears, it shows that the clock is not operating, and the ON TIMER will not function.

Press "1" (YES) to set the clock. (If "2" (NO) is pressed, the warning message "YOU CANNOT OPERATE ON TIMER!!" is displayed.)

Set the clock. See "6. SET CLOCK" on page 12 for details regarding clock setting. After the clock has been set, the message "THANK YOU!!" appears to show that the clock has just been adjusted and the ON TIMER is now ready to be set.

Two different settings are possible. Press "1" or "2" to select the setting position. The display will show:



- The second from the bottom line shows the preset time if already previously set.

1) SET

Press "1" to start the ON TIMER for turning the TV on automatically at the preset time shown. "<YES>" appears to show that the ON TIMER has started.

2) CANCEL

Press "2" to cancel the setting. "<NO>" appears to show that the ON TIMER has been cancelled.

3) CHANGE

Press "3" to re-adjust the setting. Then, the following display appears:



Press the numbers on the 10-Digit Keypad to set the desired switch-on time. For example, if you want the TV to switch on automatically for CHANNEL 12 at 7:00 AM, press "7", "0" and "0". (When you select "1" for hour setting, remember to press "0" first, then press "1".) The selected time of "7:00" appears and immediately the display changes to:



Then, press "1" to select the "AM" setting. (Press "2" to select the "PM" setting.) Then, the following display appears. Press "1" and "2" for specifying "CHANNEL 12".



Now the following display appears on the screen to show the ON TIMER is set to "7:00 AM, CHANNEL 12" with the < YES > indicating the ON TIMER has started. Finally, press POWER button  to turn the power off. POWER/ON TIMER indicator  remains lit to show that the ON TIMER is in operation.



Notes:

- If an invalid time is selected (for example: "17:70"), it will be rejected and the ON TIMER must be reset properly.
- First select the broadcast mode (CHANNEL or CABLE) of the channel you wish to set for the ON TIMER with ANT/CABLE button  on the Remote Control before entering the ON TIMER mode, since broadcast mode switching while in the ON TIMER will cancel the mode.
- After the ON TIMER has been properly set, it functions only once for each setting (up to 2 settings are possible) to turn on the TV's power. (It does not operate repeatedly every day at the same time as a serial timer.)
- Once the ON TIMER turns the TV on automatically, if the TV is not operated in any way, after 2 hours the TV will turn off automatically for safety. A single adjustment, even audio level adjustment or channel selection, will cancel this switch-off function.
- While the ON TIMER is activated, if the power is disconnected (such as in the case of power failure, etc.) and re-applied later, the ON TIMER is cancelled. When disconnected only for a couple of minutes, the ON TIMER is reactivated; however, it turns the TV on later than the set time by the amount of time of interruption.
- If the channel which has already been set as a "Guarded Channel" is selected, that channel is rejected and cannot be set for the ON TIMER. (For details of the Guarded Channels, refer to page 13.)

6. SET CLOCK

Your TV has a built-in clock. Set the clock as follows.

- With "PAGE-2" (or "PAGE-1" or "PAGE-3") MENU displayed on the screen, press "6" of 10-Digit Keypad . The display will show:



- Then, press the numbers (be sure to key in 4 digits) on the 10-Digit Keypad to set the current time. For example, if the present time is 7:35 PM, press "7", "3" and "5". Then, the display changes to:



- Press "2" to select the "PM" setting. (Press "1" to select the "AM" setting.) Then, the display changes to the following to show the current time is set and the clock starts operating.



Notes:

- If an invalid time is selected (for example: "17:70"), it will be rejected and the built-in clock must be reset properly.
- If you wish to set the clock precisely, in step 3) above, press "2" (or "1") at the same instant of a time signal.
- The built-in clock may lose time depending on the manner in which the TV is used or the frequency of the power source. If the time difference becomes great, re-adjust the clock.
- If the power is disconnected (such as in the case of a power failure, etc.), and re-applied later, the clock will stop operating. (The clock status can be checked on screen. Press the DISPLAY button. If the clock has stopped, the message "CLOCK STOPPED" is displayed instead of the current time. See "DISPLAY Button" on page 17 for details.) When disconnected only for a couple of minutes, the clock is reactivated; however, it will be later than the actual time by the amount of time of interruption.

PAGE-3

7. HOME SITTER

The "HOME SITTER" feature enables the TV to be turned on and off automatically at preset times every day.

With "PAGE-3" (or "PAGE-1" or "PAGE-2") MENU displayed on the screen, press "7" of 10-Digit Keypad . The display will show:



- At this time, if the display of "POWER INTERRUPTED/ WOULD YOU SET CLOCK FIRST?" appears, it shows that the clock is not operating, and the HOME SITTER will not function.

Press "1" (YES) to set the clock. (If "2" (NO) is pressed, the message "YOU CANNOT OPERATE HOME SITTER!!" is displayed.)

Set the clock. See "SET CLOCK" above for details regarding clock setting. After setting the clock, the message "THANK YOU!!" appears to show that the clock has just been adjusted and the HOME SITTER is now ready to be set.

1) SET

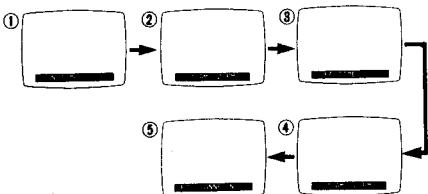
Press "1" to place the HOME SITTER in standby. The ON/OFF time and channel number which have been previously set will be displayed. When the POWER switch is pressed to turn the TV off, the POWER/ON TIMER indicator  lights and "YES" appears on the screen to show that the HOME SITTER is in operation.

2) CANCEL

Press "2" to cancel the HOME SITTER. "NO" appears to show that the HOME SITTER has been cancelled.

3) CHANGE

Press "3" to re-adjust the HOME SITTER setting. Follow the on-screen displays to set the switch-on time, switch-off time and channel number, using the 10-Digit Keypad.



- ① Set the switch-on time.
- ② Select "AM" or "PM".
- ③ Set the switch-off time.
- ④ Select "AM" or "PM".
- ⑤ Set the channel number.

When the channel number is set, the display will show:



- This display shows that the HOME SITTER is set to switch the TV on at 6:30 PM, switch it off at 11:00 PM and the channel to be received is "CABLE 13".

Notes:

- If an invalid time or channel number is selected, it will be rejected and it must be reset properly.
- First select the broadcast mode (CHANNEL or CABLE) of the channel you wish to set for the HOME SITTER with ANT/CABLE button  on the Remote Control before entering the HOME SITTER mode, since broadcast mode switching while in the HOME SITTER will cancel the mode.
- If you wish to reset the switch-on time only, stop keying in data (waiting until the on-screen display disappears) after keying in the AM/PM setting, or press keys other than 10-Digit Keypad. And, if you wish to reset the switch-on and switch-off time only, the procedure is the same.
- The function that automatically turns the TV off for the ON TIMER, if no TV operation is performed after 2 hours, does not operate for the HOME SITTER.
- If the power is disconnected (such as in a power failure, etc.), and re-applied later, the HOME SITTER will be cancelled. When disconnected only for a couple of minutes, the HOME SITTER is reactivated; however, it turns the TV on and off later than the set time by the amount of time of interruption.
- If the channel which has already been set as a "Guarded Channel" is selected, that channel is rejected and cannot be set for the HOME SITTER. (For details of the Guarded Channels, see below.)

8. CHANNEL GUARD

The "CHANNEL GUARD" feature allows you to assign an "ID number" to specific channels of your choice, making them "Guarded Channels". This prevents these specific channels from being selected, unless the "ID number" is keyed in.

First select a channel you wish to set as a Guarded Channel. With "PAGE-3" (or "PAGE-1" or "PAGE-2") MENU displayed on the screen, press "8" of 10-Digit keypad . The display will show:



Then, press "0". The display changes to:



- Channel numbers displayed are the Guarded Channels, if already previously set.

1) SET

Press "1". The display changes to:



For example, if the current channel being received is "CHANNEL 25", and you wish to store this channel as Guarded Channel 1, then press "1". The display changes to show that CHANNEL 25 is now set as Guarded Channel 1.

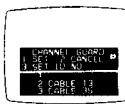


2) CANCEL

Press "2" to cancel the Guarded Channel. The display will show:



With this display on the screen, press the number of the Guarded Channel you wish to cancel from the list. For example, if you wish to cancel CHANNEL 25 (in this case, Guarded Channel 1) from the list, press "1". Then the display changes to show that CHANNEL 25 (Guarded Channel 1) has been cancelled.



3) SET ID NO.

Press "3" to set the ID number. The display will show:



Press any 3 digits you wish to be the ID number. When completed, "ENTERED" appears to show that the ID number you have just keyed in is set.



Viewing Guarded Channels

1) Select the Guarded Channel. (If the Guarded Channel you wish to view is CHANNEL 25, press "2" and "5".) Then, the following display appears:



- 2) Key in the ID number using the 10-Digit Keypad. The channel appears.
- 3) If the keyed-in ID number is incorrect, the display shows:



And the Guarded Channel you have selected cannot be seen.

Notes:

- If you wish to change the ID number, follow the steps of "3) SET ID NO.".
- If the power is disconnected (such as in the case of power failure, etc.), and re-applied later, the ID number is reset to "000".
- When performing the CHANNEL SCAN function, or selecting channels using CHANNEL (-+) buttons , the Guarded Channels are skipped.
- In the following cases, the Guarded Channel can be seen without keying in the ID number:
 - =When you press the RETURN button  from a channel which has been selected immediately after viewing a Guarded Channel.
 - =When you press ANT/CABLE button  from a different broadcast mode (CHANNEL or CABLE) which has been selected immediately after viewing a Guarded Channel.
 - =When you press CHANNEL (-+) buttons  on the Remote Control or CHANNEL/LEVEL (-/+) buttons  on the front panel, while in the MANUAL PROGRAM mode of the INITIAL SET-UP (or MENU PAGE-3), if the selected channel which has already been ADDED happens to also be a Guarded Channel.
 - =When you press "4" (CHANNEL UP) or "5" (CHANNEL DOWN) of the 10-Digit Keypad while in the MANUAL PROGRAM mode of the INITIAL SET-UP, if the AUTO PROGRAM is interrupted immediately when a Guarded Channel appears.
 - =When the channel which has already been set for the ON TIMER or HOME SITTER is set as a Guarded Channel.
- If you forget the ID number which you have set, reset it.

9. INITIAL SET-UP

The INITIAL SET-UP feature allows you to perform basic settings for the TV status. This consists of Channel Memory (Auto/Manual), Message Style and Noise Mute.

Note: When performing Channel Memory (MANUAL PROGRAM), select an appropriate broadcast mode (either "CHANNEL" or "CABLE") before you select the INITIAL SET-UP mode.

With PAGE-3 (or PAGE-1 or PAGE-2) MENU displayed on the screen, press "9" of 10-Digit Keypad . The display will show:



Press appropriate 10-digit key to select the item.

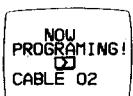
1) AUTO PROGRAM

This function allows memorizing the channels automatically to match the TV broadcasts and cable channels of your area. The memorized channels can be selected by the CHANNEL (-+) buttons  on the Remote Control or CHANNEL/LEVEL (-+) buttons  on the front panel, or in the CHANNEL SCAN mode, while skipping channels where there are no broadcasts.

Press "1" of the 10-Digit Keypad. The following display will appear and the program set-up procedure begins automatically.



When tuned to a channel in which a TV program is broadcast, the following display appears and this channel is memorized.



When the AUTO PROGRAM procedure (scanning and memorizing) is completed, it will be indicated by the following display.



Notes:

- If the broadcast signals are weak, the channel may not be memorized. In this case, perform the MANUAL PROGRAM procedure.
- The AUTO PROGRAM procedure takes approximately 4 minutes. If you wish to stop this procedure before completion, press any button on the remote control.

2) MANUAL PROGRAM

Similar to the AUTO PROGRAM function above, this is for memorizing channels, but it is performed manually. The resulting Manual Programming is also effective when performing up/down channel selection or CHANNEL SCAN.

Press "2". The display will show:



The current tuned-in channel

Simply follow the on-screen instructions.

Note: First select the broadcast mode before entering this MANUAL MEMORY mode.

- 1) Press "1" (ADD) to add this channel in memory. A bar "-" will appear between the broadcast mode (CHANNEL or CABLE) and the channel number to show that the channel has been memorized.
- 2) Press "2" (ERASE) to erase this channel from memory, if you do not wish to preset it in memory or if no TV station is broadcasting on it. The bar between the broadcast mode and channel number will disappear.
- 3) Press "4" (CHANNEL UP) or "5" (CHANNEL DOWN) to select the next higher or lower channel.
- 4) Press "3" (END) when you have stored all required channels in memory.

5) When you wish to store channels of the other broadcast mode, select the mode first, then repeat steps 1) through 4).

- In step 3) above, if selecting channels is difficult, press the CHANNEL (-+) buttons on the Remote Control or CHANNEL/LEVEL (-+) buttons on the front panel.

3) MESSAGE STYLE

This function is for switching the black background of the on-screen display on and off (except for channel numbers and clock time.) Press "3". The display will show:



Press "1" to select the on-screen display mode with a black background.



(VOLUME indication)

Press "2" to select the on-screen display mode without a black background.



(VOLUME indication)

4) NOISE MUTE

The NOISE MUTE feature allows replacing the "snowy" screen of vacant non-broadcast channels with a blue-blank screen; and, at the same time, muting the noisy sound.

Press "4". The display will show:



Press "1" to select the Noise Mute mode for a blue-blank screen with no sound.

Press "2" to release the mode. Screen is normal (without blue-blank screen) and sound can be heard.

Note: The Noise Mute mode can be activated only when either no signal is being input or when a weak signal is being received.

- If you wish to view a TV program having a weak broadcast signal, release the Noise Mute mode to prevent it from being activated.
- If you use an antenna system, before adjusting it (extending, rotating, etc.), release the Noise Mute mode to prevent it from being activated when the signal condition changes.
- When playing back VCR recordings or the like, picture and sound muting conditions might continue to occur for a few seconds after engaging the Play mode. Release the Noise Mute mode when necessary.
- When the Noise Mute mode is engaged, it is also applied to the output signals, both from LINE OUT connectors and from AUDIO OUT (VARIABLE) connectors. Release the Noise Mute mode to prevent it from having effect when connecting external components to the TV.

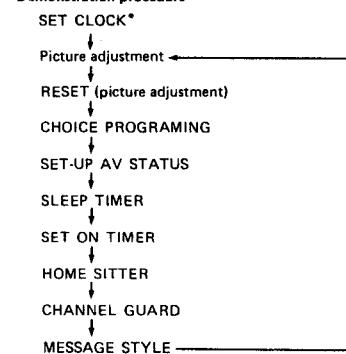
MASTER COMMAND III / SELF-DEMONSTRATION FEATURE

Your TV has a self-demonstration feature for the incorporated MASTER COMMAND III system, demonstrating automatically all major functions of the MASTER COMMAND III.

With PAGE-1 (or PAGE-2 or PAGE-3) MENU displayed, press "0" twice of the 10-Digit Keypad ("0-0"), or press the FUNCTION and VOLUME (-) buttons on the front panel simultaneously. The demonstration automatically begins in the following order. If you wish to stop the demonstration anytime while it is running, press any key on the Remote Control or on the front panel.



Demonstration procedure



*The SET CLOCK mode can operate only when the built-in clock is stopped.

Note: Operating this function adjusts the clock, timer settings, and all other functions to specific demonstration settings. Therefore, re-adjustment of these settings is required once the demonstration has been executed.

MORE USEFUL FUNCTIONS

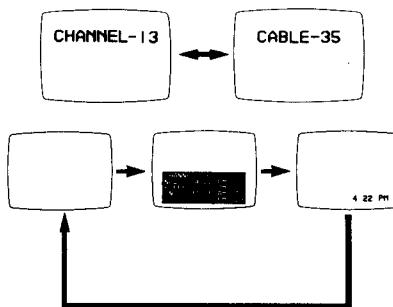
RETURN Button

Press RETURN button ● on the Remote Control. The previously viewed channel will appear on the screen. Press RETURN again to switch back to the original channel. Repeatedly pressing RETURN switches between these two channels.

DISPLAY Button

Press DISPLAY button ● on the Remote Control. The channel number of the program you are now viewing, the SLEEP TIMER/ON TIMER settings and the current time are displayed in the order as shown on the right by each pressing of the DISPLAY button. The current time remains displayed on the screen until the DISPLAY button is pressed again.

Note: If the SLEEP TIMER and/or ON TIMER is cancelled, their settings will not be displayed.

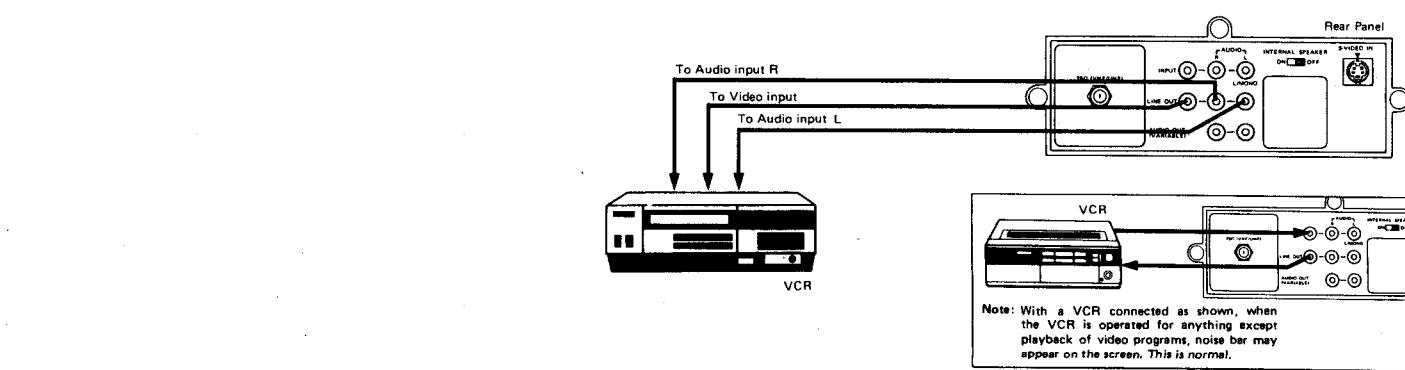


MUTE Button

Press MUTE button ● on the Remote Control. The sound of the TV program being viewed will be reduced to zero and 'VOLUME 0' will appear on the screen.

Press again to restore the sound.

Note: Changing the audio volume or channel number also restores the sound.



CONNECTING TO EXTERNAL EQUIPMENT

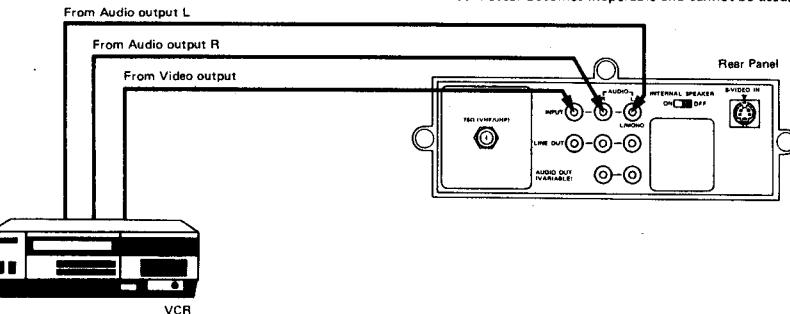
- Prior to making any connections to your TV set, be sure to turn the POWER off.
- For a more detailed understanding of each connection, it is recommended that you read the instruction manual for each connected component.
- If you use video or audio equipment placed too near the Monitor/Receiver, picture and/or sound may become distorted due to interference between these components. In such a case, separate each piece of equipment at a sufficient distance.
- The following shows examples for connecting external equipment.
- Do not connect another audio source to the same speaker to which the TV set is connected, otherwise damage may result to the amplifier of the TV set or to that of the other audio source.

1 VIDEO/AUDIO INPUT-connectors

- To view a connected video source, press TV/VIDEO button ● on the Remote Control to engage the VIDEO mode.

Notes:

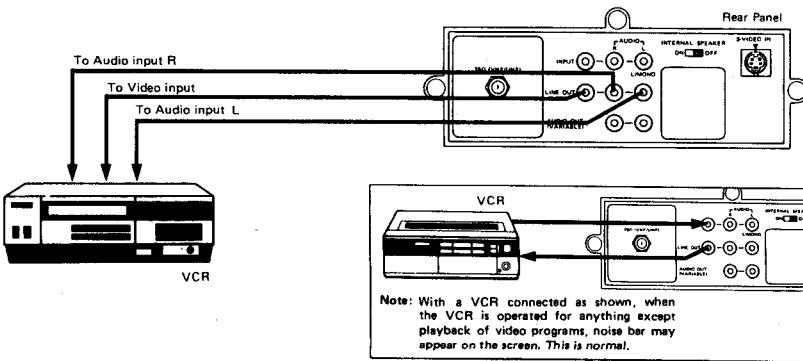
- If the connected video equipment outputs monaural audio, connect to the AUDIO L/MONO (left channel) connector. Sound will be output from both right and left speakers.
- When the S-VIDEO IN connector is used, this VIDEO connector becomes inoperable and cannot be used.



2 LINE OUT connectors

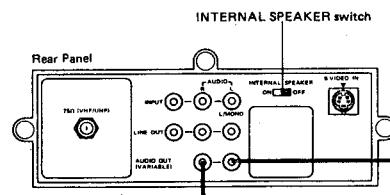
- The video and audio signals available at these connectors are the same as the source presently being monitored on the TV.
- This is convenient for VCR connection.

Note: Video signals that are input to S-VIDEO IN connector cannot be output from VIDEO connector of LINE OUT connectors.



3] AUDIO OUT (VARIABLE) connectors

- The audio signals available at these connectors are the same as the audio source of the program being monitored on the TV screen.



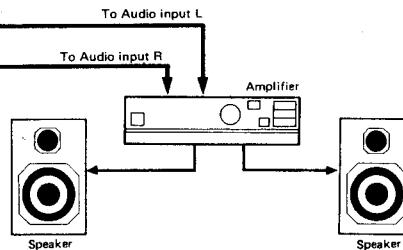
Note: Sound can be listened to or not from the built-in speakers, depending on the setting of INTERNAL SPEAKER switch (●).

ON: Sound can be listened to from the built-in speakers.

OFF: Sound cannot be listened to from the built-in speakers.

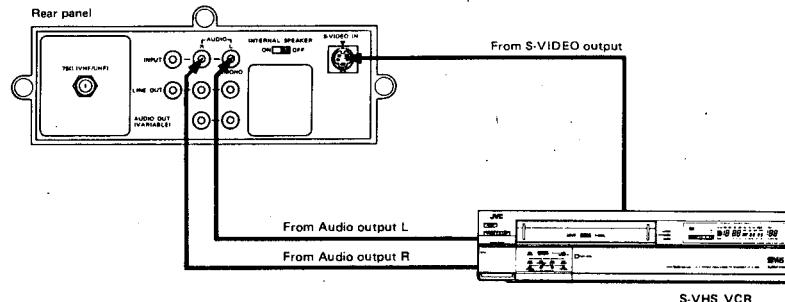
Audio signal is always available from AUDIO OUT connectors (●) regardless of setting of the INTERNAL SPEAKER switch.

- Connect to a stereo amplifier to these connectors to listen to the sound through external speakers connected to the amp. The audio output level can be adjusted via the VOLUME (-/+ buttons) on either the Remote Control or front panel.
- If the sound which is output from the TV's built-in speaker is noisy, set the INTERNAL SPEAKER switch (●) to OFF to turn off the sound from the built-in speakers.



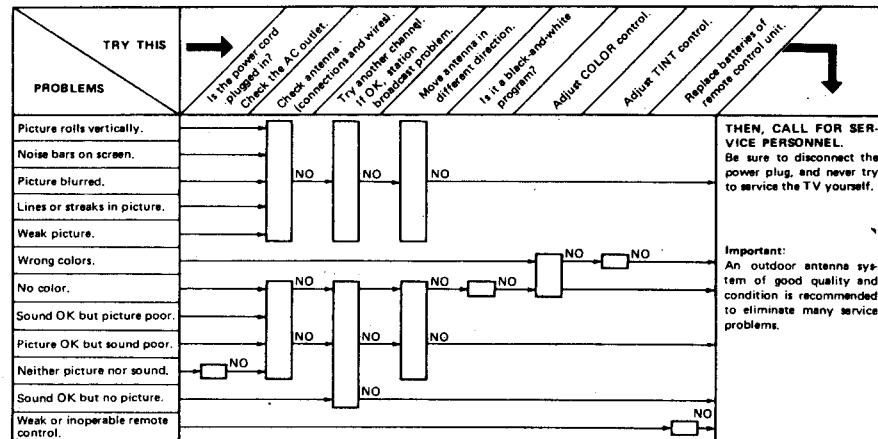
4] S-VIDEO IN connector

- S-VIDEO IN connector is for the separated Y (luminance) and C (chrominance) video signals conforming to the NTSC system, ideal for connection of an S-VHS (Super VHS) VCR.
- Connect the audio output cable to AUDIO INPUT connectors.



BEFORE YOU CALL FOR SERVICE

Be sure to review all the instructions written in this booklet. Then try to check according to the following chart.



SPECIFICATIONS

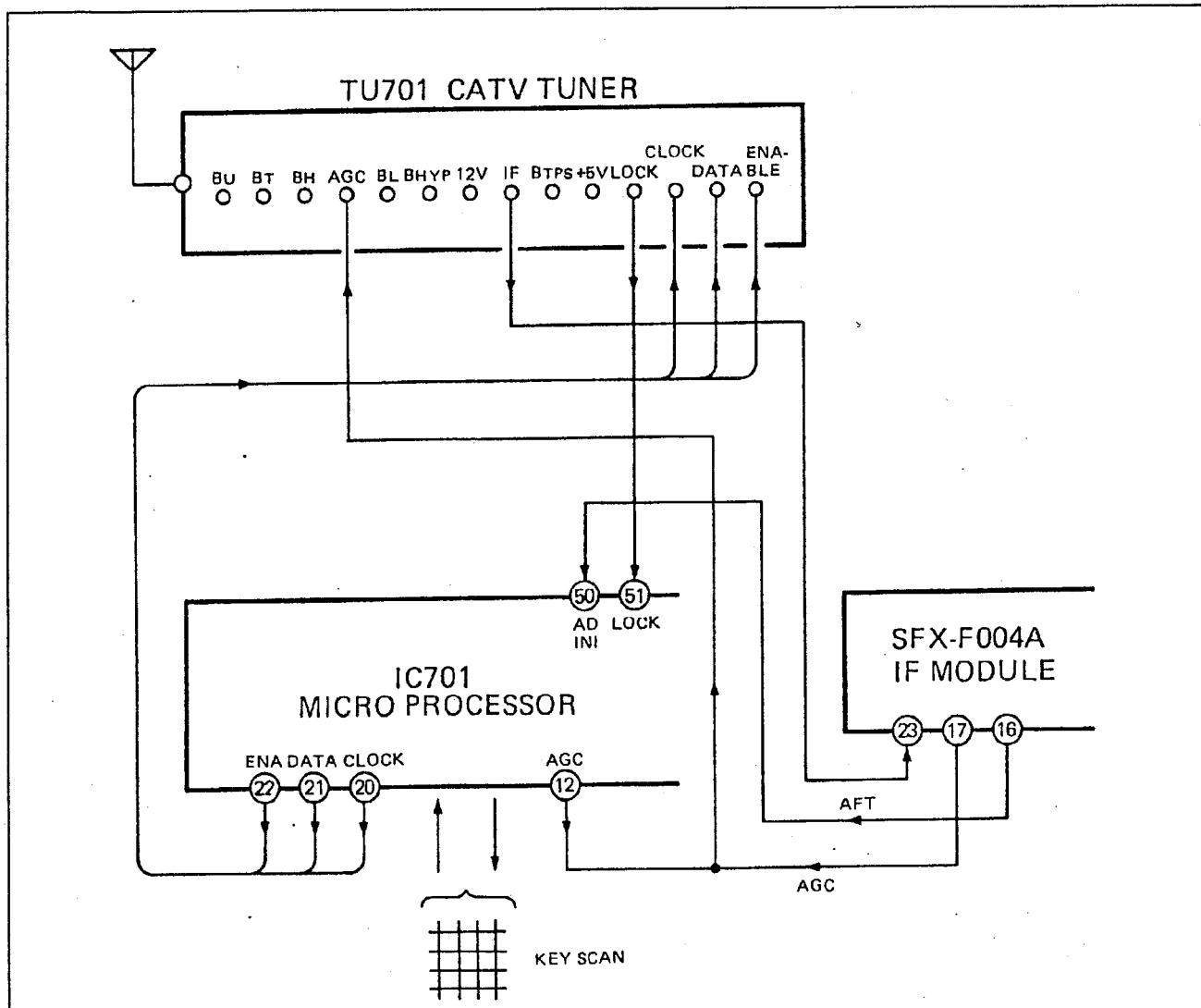
Type	: Color monitor/receiver	Line output terminals	: Video/1 Vp-p, 75 ohms
Reception system	: NTSC system, BTSC system (Multichannel sound)	Audio/500 mV rms (-4 dBs), low impedance (400 Hz when modulated 100 %)	
Channel coverage	: VHF 2 – 13, UHF 14 – 69; Sub-Mid, Mid, Super, Hyper and Ultra bands (180-channel frequency synthesizer system)	S-VIDEO IN terminal	: Y/1 Vp-p positive, 75 ohms (negative sync provided)
Power requirement	: AC 120 V, 60 Hz	Variable audio output terminals	C/0.286 Vp-p (burst signal), 75 ohms
Power consumption	: Max. 135 W, Avg. 98 W	External dimensions (W x H x D)	: More than 0 – 1000 mV rms (+2.2 dBs), low impedance (400 Hz when modulated 100 %)
Screen size	: 26" diagonally measured, Full Square	Weight	: 25-7/8" x 20-3/8" x 22-7/8"
Audio output	: 2.2 W + 2.2 W	Accessories	: 75.9 lbs
Speakers	: 2" x 3-1/2" ellipse x 2		: Remote control unit (RM-C422)
Antenna input terminal	: 75-ohm (VHF/UHF) terminal (F-type connector)		: AA-size dry cell battery x 2
External input terminals	: Video/1 Vp-p, 75 ohms Audio/500 mV rms (-4 dBs), high impedance		

Design and specifications subject to change without notice.

TECHNICAL INFORMATION

CIRCUIT ANALYSIS

•BLOCK DIAGRAM



1. Tuning function

- (1) The PLL synthesizer formula is employed for the S.SELECT circuit of the tuner.
- (2) The PLL of this equipment comprises the following circuits.
 - a) 4 MHz quartz oscillating circuit.
 - b) 10 bit reference frequency dividing circuit.
 - c) Programmable divider (composed of 10 bit Main counter and 5 bit swallow counter), phase comparator and lock detector.
 - d) 4 circuits of band switch-over are built in.

2. Microcomputer IC (MN152121JMT)

The main built-in circuits are as follows.

- a) Built-in character generator.
- b) Pulse swallow process PLL and 14 bit DA converter are built in.
- c) Program memory (ROM)----- 4 bit x 12288 steps
- d) Data memory (RAM)----- 4 bit x 448 words

MICRO PROCESSOR (MN152121JMT)

•PIN FUNCTIONS

Pin No.	Code	Name	Function
①	VSS1	GND terminal	To connect the ground (0 V).
②③	OSC1,2	Oscillating terminal	To oscillate the system clock by connecting the oscillating element to the capacitor .Feedback resistor is built in.
④	RST	Reset signal input terminal	Resetting is effected by inputting the "L"level for more than i machine cycle. Pull-up resistor optional.
⑦	IRQ P70	Interruption signal	By inputting a negative edge signal,interruption of program control is accepted. Remote-control signal discriminant function is employed. The input terminal level can be monitored by the interior port p70.
⑧~⑯	P00~P07	Parallel data output terminal	Output port for 4- bit parallel gata. 12V-level,high-voltage-proof N-channel open drain output is available.
⑯~⑯	P20~23	Parallel data input terminal	Input port for 4-bit parallel data. pull-up resistor optional. P21~P23 can be used for SBI/SBO/SBT terminals,respectively,which transfer the serial data. p23 have a capacity of high-voltage-proof opened drain output.
⑯~⑯	P30~33	Parallel data input.output terminal	Input / output port for 4-bit parallel data. The pull-up resistor in the input mode optional. P33 can also be used for the exclusive input terminal for SD counter.
⑯~⑯ ⑯	P40~42 P50	Parallel data output terminal	Output port for 4-bit parallel data.
⑯	SIRQ/P71	Interruption signal input terminal	When a negative adge signal is input,interruption of program control is accepted. The input terminal level can be monitored by the interior port P71.
⑯	ACIN	Input terminal	Real-time counter reading AC input terminal. By setting the P51 to "h",the input signal can be monitored by the interior port P53.
⑯~⑯ ⑯	VOW3~1 VOB	Display signal output terminal	Character-generator character signal output terminal. VOB is background output. This can also be used for E port output.
⑯⑯	DOSC2,1	Oscillator terminal	Clock oscillator terminal for character generator.(LC oscillation)
⑯~⑯ ⑯⑯	ADAC9~ADAC0	DAC output terminal	Output terminal for volume DAC. Coupled to low-pass filter. 12V-level, high-voltage-proof N-channel open drain output. ADAC0~5 (6 bit DAC). ADAC6~9 (8 bit DAC).
⑯⑯	V SYNC H SYNC	Synchronous input terminal	Horizontal/vertical synchronous signal input terminal for character generator. The horizontal synchronous signal can be monitored by the PCO.
⑯	PSC.TDAC	Output terminal	Prescaler control output terminal. 14 bit (TDAC) output terminal in the VS mode.
⑯	VSS2	GND terminal	To connect the ground (0 V).
⑯	PDD,DA15	Output terminal	Output terminal for VCO control. Level output (DA15) terminal in the VS mode.
⑯⑯	ADIN2,1	Input terminal	AD-converted voltage input terminal.
⑯	LFI/P61	Input terminal	Prescaler control input terminal. Level input (P61) terminal in the VS mode.
⑯	VDD1	Power supply terminal	To connect +4.5~5.5V.

SPECIFIC SERVICE INSTRUCTIONS

DISASSEMBLY PROCEDURE

REMOVING THE REAR COVER

1. Unplug the power supply cord and remove the eleven screws marked \odot shown in Fig. A.

When reinstalling the rear cover, carefully push it inward after inserting the main PC board into the rear cover groove.

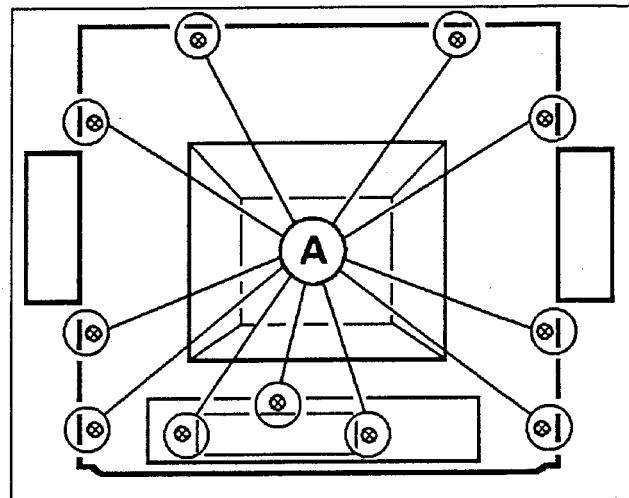


Fig. A

REMOVING THE MAIN PC BOARD

* After removing the rear cover,

1. Remove the two screws marked \odot shown in Fig. B.
2. Withdraw the PC board backward along the rail. (Fig. B)

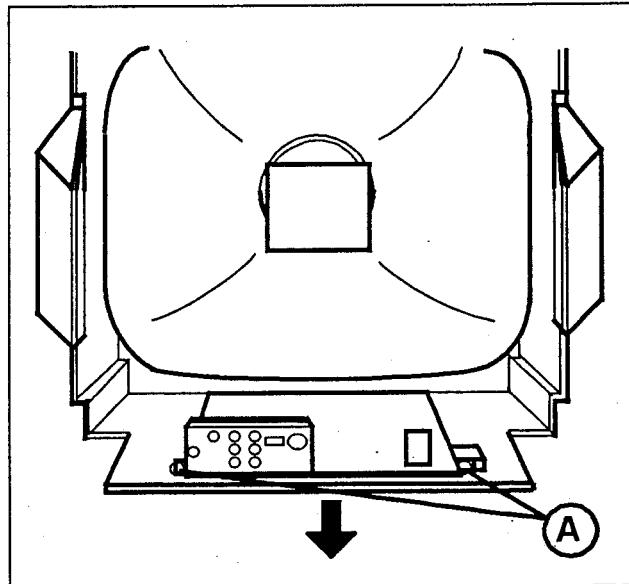


Fig. B

REMOVING THE POWER P.C. BOARD

* After removing the rear cover,

1. Remove the two screws marked \odot shown in Fig. C, and, then remove the POWER PC BOARD straight toward the arrow.

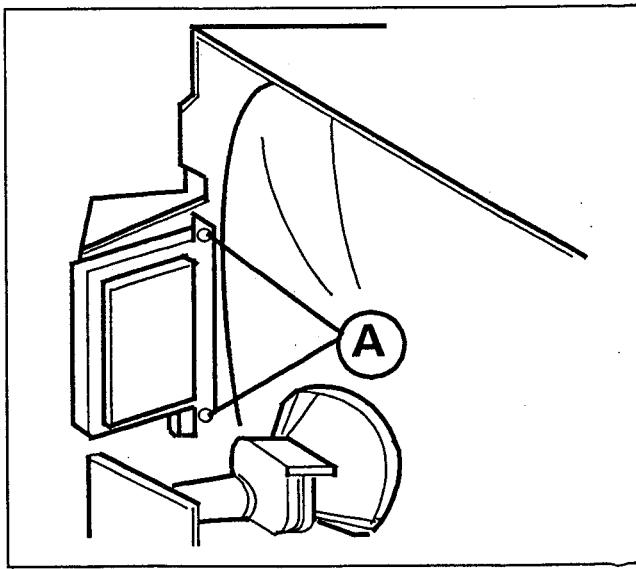


Fig. C

REMOVING THE POWER TRANSFORMER

1. Unscrew the screw marked A shown in Fig. D.
2. Withdraw the power transformer backward.

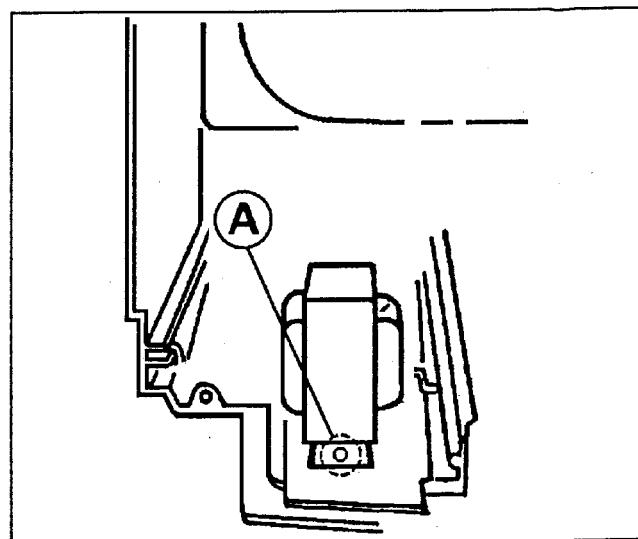


Fig. D

SETTING UP THE CHASSIS FOR CHECK / REPAIR

As shown in Fig. E, set the removed chassis upright.

When conducting a check with power supplied, be sure to confirm that the CRT earth wire is connected to the CRT socket board and the chassis.

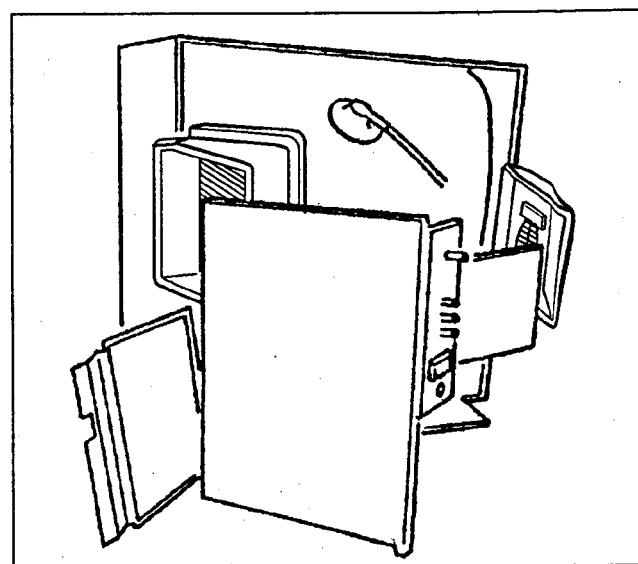


Fig. E

WIRE CLAMPING AND CABLE TIES

Be sure to clamp the wire.

Never remove the cable tie used for tying the wires together.

Should it be inadvertently removed, be sure to tie the wires with a new cable tie.

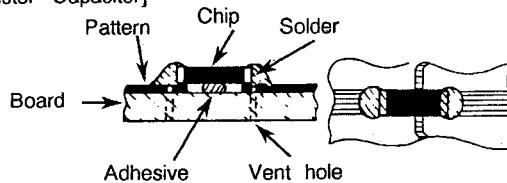
REPLACEMENT OF CHIP COMPONENTS

- CHIPS ARE NOT USED ON CERTAIN MODELS. REFER TO THE DESCRIPTIONS ON THIS PAGE ONLY WHEN WORKING ON MODELS ON WHICH CHIPS ARE EMPLOYED.

Replacement of the chip on printed circuit board can be performed easily as follows.

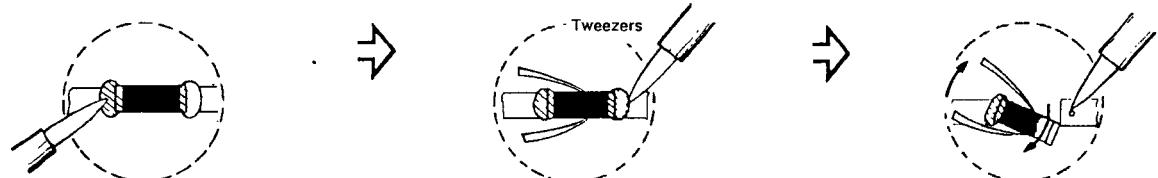
1 When mounted

[Resistor · Capacitor]



2 Removal of the chip

- Remove either of the soldered contacts.
- Hold the chip with tweezers and remove the other contact.
- Work the chip free from the adhesive with tweezers.

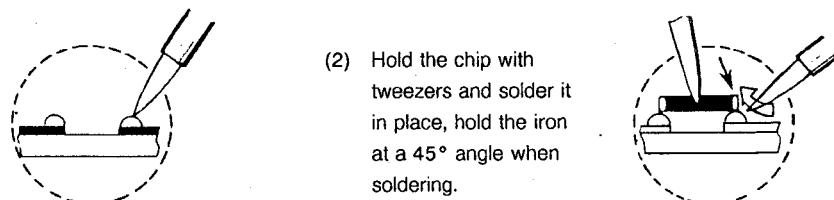


3 Preheating and soldering of chip pieces

Be sure to preheat chip pieces (except the transistor) especially the capacitor before soldering with hot air, about 150°C (hair dryer or such can be used) for about 2 minutes. Then, immediately solder with an iron of about 30W.

4 Replacing the chip pieces

- Apply the solder to the board first.

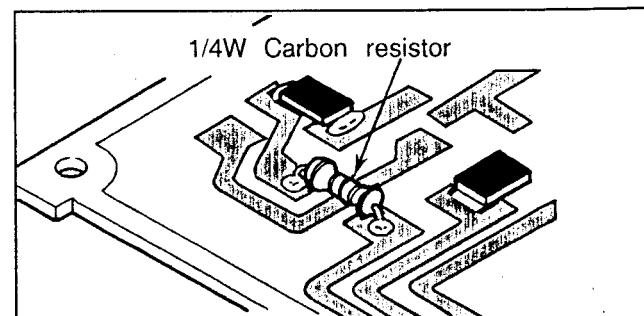


- Discrete parts can be substitutionally mounted as shown in the figure on the right.

Mounting is also possible by passing the wires from the board front side (parts side) through the chip soldering hole (vent hole of registration part).

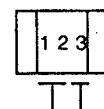
Substitute parts are as follows.

- Chip Metal Glaze Resistor
→Carbon Resistor 1/4W $\pm 5\%$
- Chip Ceramic Capacitor
→Ceramic Capacitor 50V $\pm 5\%$



- Decoding of chip parts constant terms

<Chip Metal Glaze Resistor>



Constant Multiplier term

$$12 \times 10^3 = 12000\Omega = 12k\Omega$$

<Chip Ceramic Capacitor>

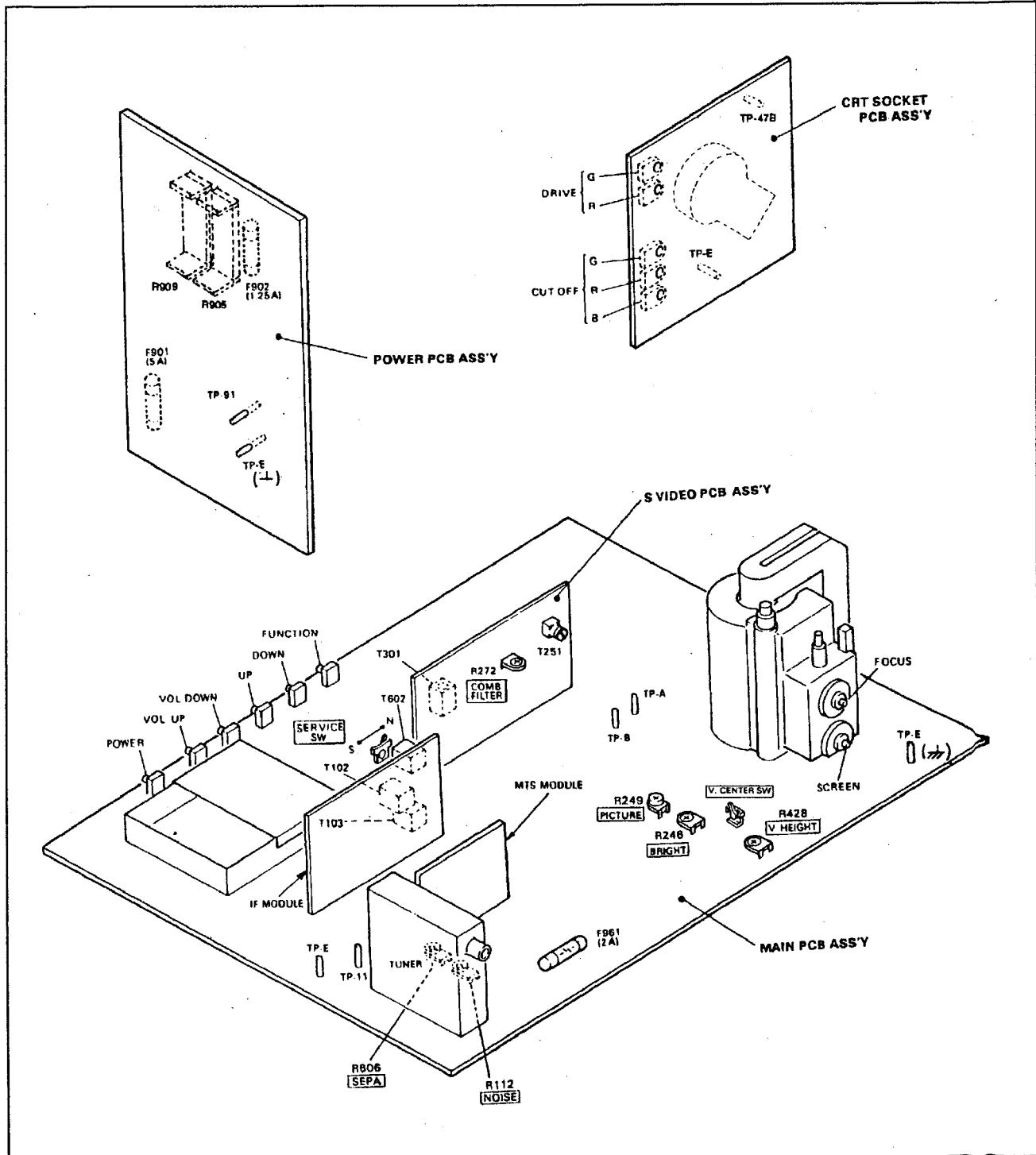
Constant term	12	K, M, Z, P	Tolerance of ordinary type
Multiplier	3 E	C, P, R, S, T, U . . .	Temperature coefficient of temperature compensation type
		12 $\times 10^3$ = 12000pF = 0.012 μ F	

SERVICE ADJUSTMENT

TOOLS AND FIXTURES FOR ADJUSTMENT

- DC VOLTMETER
- OSCILLOSCOPE
- PATTERN GENERATOR(NTSC)
- TV MULTI CHANNEL SOUND GENERATOR.

ADJUSTMENT LOCATION



HOW TO CHECK THE HIGH VOLTAGE HOLD DOWN CIRCUIT

1. High voltage hold down circuit.

After repair of the high voltage hold down circuit shown in Fig.1, this circuit shall be checked to operate correctly.

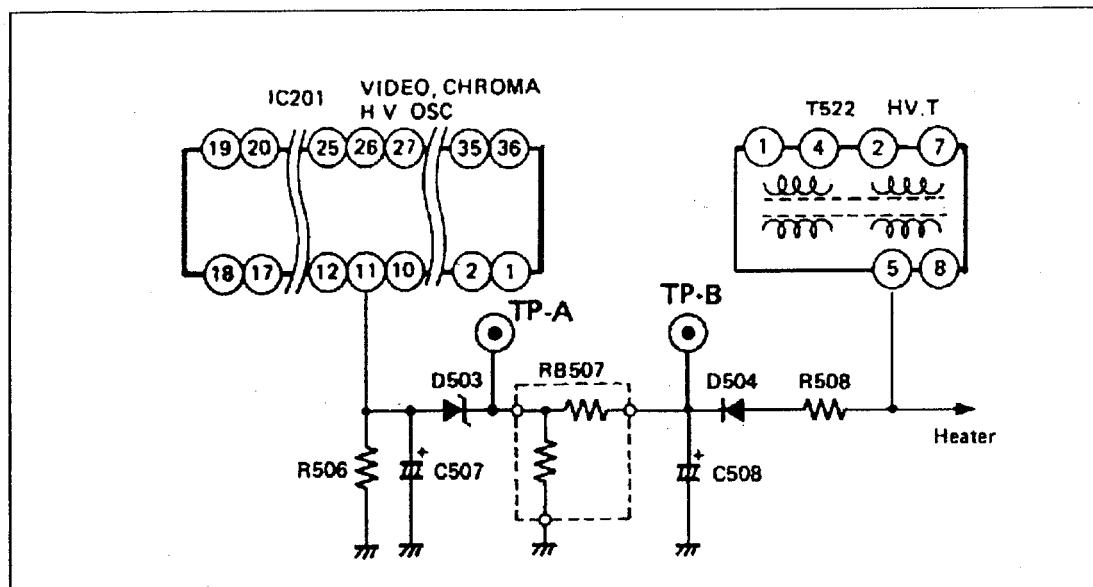


Fig. 1

2. Checking method of the high voltage hold down circuit.

(1) Make the short circuit across R905, 330 Ω 15W UNF R (shown in Fig.2,) under normal operating condition.

(2) Confirm the picture goes out.

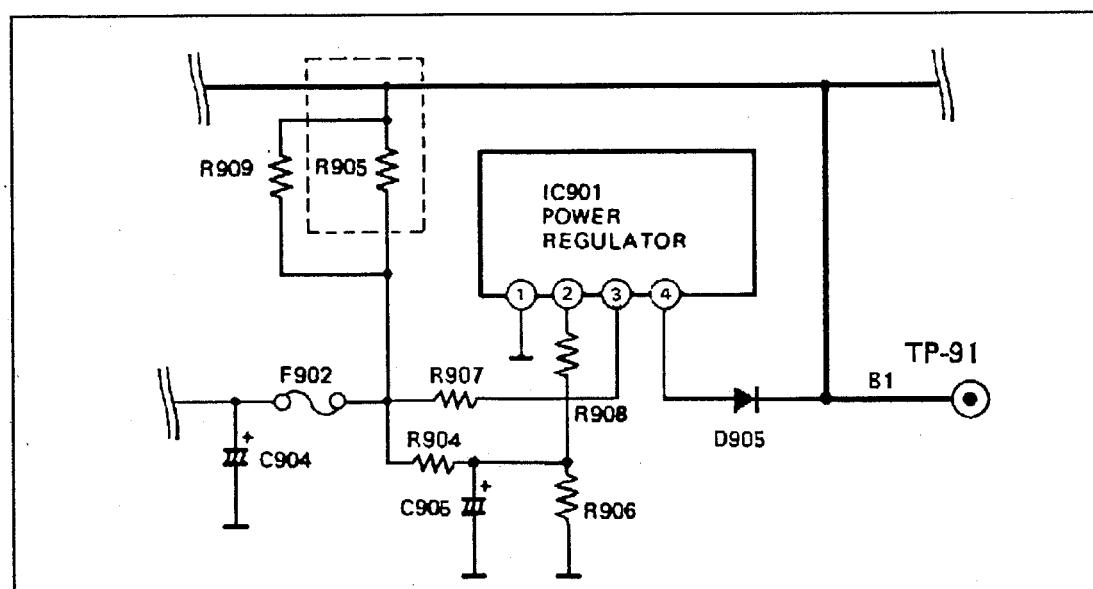


Fig.2

ADJUSTMENT

Item	Measuring instrument	Test point	Adjustment part	Description
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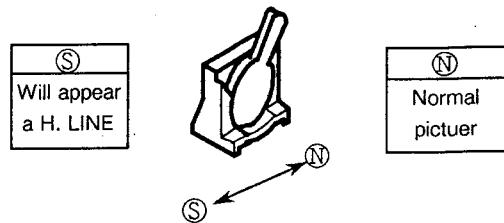
POWER CIRCUIT

B1 POWER SUPPLY	DC VOLTE METER	TP-91 TP-E (\perp)		1. Confirm that the voltage between TP-91 and TP-E (\perp) is DC 129.3 V.
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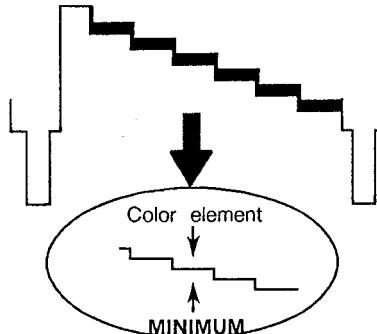
MAIN CIRCUIT

NOISE (RF. AGC)			NOISE VR	<ol style="list-style-type: none"> 1. Adjust the NOISE VR so that the noise appears in the image. 2. Next turn the NOISE VR in a direction that the noise disappears from the image and stop at the point where the noise has disappeared from the image. 3. Turn to another channel and confirm that there are no abnormalities.
SUB BRIGHT			SUB BRIGHT VR	<ol style="list-style-type: none"> 1. Press the remote control reset button twice to set the brightness to the standard level. 2. Adjustment of SUB BRIGHT VR to optimum brightness. * Avoid excessive brightness
SUB PICTURE			SUB PICTURE VR	<ol style="list-style-type: none"> 1. Press the remote control reset button twice to set the picture to the standard level. 2. Adjust the SUB PICTURE VR to the optimum picture.
VERTICAL HEIGHT	PATTERN GENERATOR		VERTICAL HEIGHT VR	<ol style="list-style-type: none"> 1. Receive a picture that enables vertical symmetry to be checked. 2. Using the VERTICAL HEIGHT VR, reduce the picture vertically. 3. Upon adjusting with the VERTICAL HEIGHT VR, return the picture to normal vertically.
FOCUS			FOCUS VR	<ol style="list-style-type: none"> 1. Adjust the FOCUS VR to obtain clear pictures. 2. Check that pictures have been adjusted to optimum appearance in both central and peripheral areas of the screen.
SEPARATION	TV MULTI CHANNEL SOUND GENERATOR OSCILLOSCOPE	AUDIO OUTPUT L, R	SEPARATION VR	<ol style="list-style-type: none"> 1. Set the TV multichannel sound signal generator for generating stereo signal and output signal of about 3KHz from the left channel. 2. Connect an oscilloscope to the "L" output and obtain a clear view of 1- cycle portion of 3KHz waveforms. 3. Change connection of the oscilloscope to the "R" output and expand the voltage axis. 4. Adjust the SEPARATION VR and minimize the 3KHz crosstalk portion. <p>L-Channel signal waveform 1 cycle Minimum R-Channel crosstalk portion</p> <p>NOTE : Do not touch the VRs inside the MULTICHANNEL SOUND CIRCUIT.</p>

Item	Measuring instrument	Test point	Adjustment part	Description
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HORIZONTAL LINE			SERVICE SWITCH	<p>1. Turning the SERVICE SWITCH from the N side to the S side will bring the horizontal line display to the screen.</p> 
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S.VIDEO CIRCUIT

COMB FILTER	PATTERN GENERATOR OSCILLOSCOPE	TP-46 or pin ⑪ IC361	DL P TRANSF. COMB FILTER VR	<p>1. Receive the color bar signal image.</p> <p>2. Connect the oscilloscope to TP-46 or pin ⑪ of IC361. Magnify the chrome signal portions of the color bar waveform so that the 3.58 MHz elements become easy to observe.</p> <p>3. Adjust DLP Transf. (T251), and minimize the 3.58MHz elements.</p> <p>4. Regulate the COMB FILTER adjustment VR (R272) to further minimize the 3.58MHz elements.</p> <p>5. Repeat steps 3 and 4 to fully minimize the 3.58MHz elements.</p> 
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PURITY, CONVERGENCE AND WHITE BALANCE

* The locations of SERVICE SWITCH, SCREEN VR, CUT-OFF VR and DRIVE VR are described in the ALIGNMENT LOCATION of SERVICE ADJUSTMENT or the SCHEMATIC DIAGRAM.

PICTURE TUBE

The picture tube is a precision in-line gun type. For this picture tube, dynamic convergence is carried out by a precision deflection yoke which eliminated the use of convergence yoke and convergence circuit. The adjustment of picture tube is therefore made easier as only the adjustment of static convergence by using a magnetic is enough. The deflection yoke and purity/convergency magnets assembly has been set at the factory and requires no field adjustments. However, should the assembly be accidentally jarred or tampered with, some or all adjustments may be necessary.

COLOR PURITY & VERTICAL CENTER

Loosen yoke retaining screw (Fig. B-1). With a sharp knife cut between the picture tube and the wedge. Remove wedges completely and clean off dried adhesive from the picture tube. PAINT is used to lock the tabs of the purity/convergence magnet assembly in place (Fig. B-1). The paint must be removed with the end of a screwdriver before any adjustments are attempted.

(As to models equipped with a magnet locking ring, beforehand loosen it.)

1. Select no signal UHF channel. (or Display a monochrome pattern)
2. Let the purity tabs come in line horizontally as is shown in Fig. B-2. A long tab should be in the same direction as the other short tab.
3. Move the yoke slowly backward.
4. Turn the GREEN CUT-OFF VR to maximum and the RED and BLUE CUT-OFF VRs to minimum. Then adjust the SCREEN VR so that the green band can be seen best. (Fig. B-3)
5. Rotate the two tabs in the opposite directions and with them kept at an angle, together in either direction so that the green band is centered on the picture tube.
6. Check the vertical center position by displaying a horizontal line. (Select the CUT-OFF SERVICE SWITCH from N to S and a HORIZONTAL LINE will appear.) Unless correct, bring it to the nearest center by rotating the two tabs, kept at an angle, together in either direction. (Fig. B-4)
7. Repeat steps 5 and 6 alternately until the green band and the vertical center come to the center.
8. Move the yoke slowly towards the bell of the tube so that the whole surface of the picture tube is filled with a green pure raster.
9. Turning RED or BLUE CUT-OFF VR to maximum and GREEN CUT-OFF VR to minimum, make sure of a red or blue pure raster.
10. Secure yoke retaining screw (do not install wedges at this time).

(As to models equipped with a magnet locking ring, secure it and keep six magnets from moving even if it is touched slightly.)

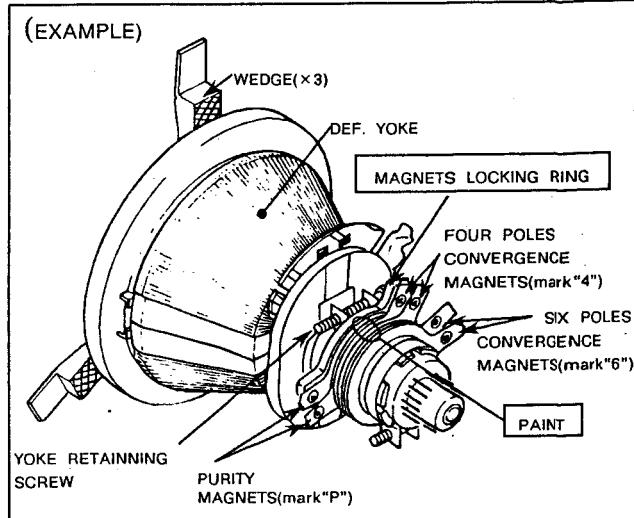


Fig.B-1

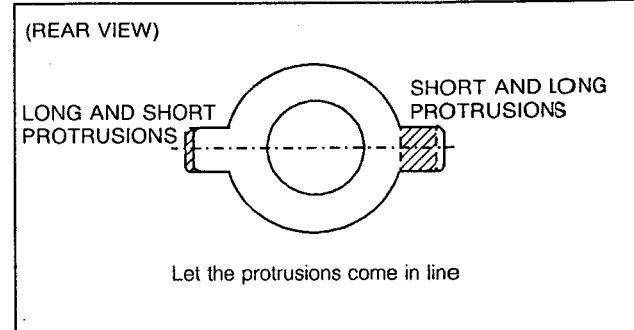


Fig.B-2

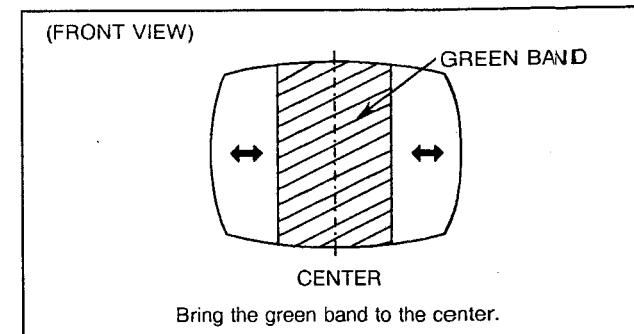


Fig.B-3

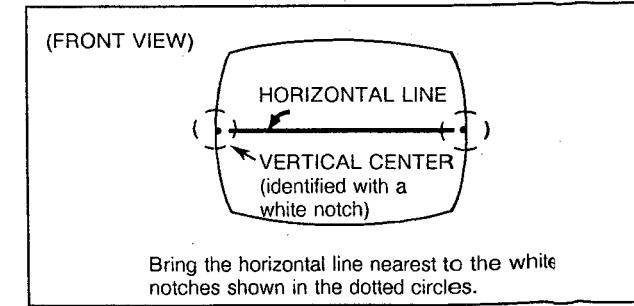


Fig.B-4

STATIC CONVERGENCE & DYNAMIC CONVERGENCE

1. Connect a crosshatch generator to the input terminals and adjust BRIGHTNESS and CONTRAST control for a distinct pattern.
2. Adjust the convergence around the edges of the picture tube by tilting the yoke, up-down and left-right, and temporarily install one wedge at the top of the yoke. (Fig. B-7, 8, 9)
3. Rotate the front pair of tabs (four pole convergence magnet) as a unit to minimize the separation of the red and blue lines around the center of the screen. To adjust the convergence of red and blue, vary the angle between the tabs (Fig. B-5)
4. Rotate the rear pair of tabs (six pole convergence magnets) as a unit to minimize the separation of the magenta (R/B) and green lines. (Fig. B-6)
5. Adjust the spacing of the rear tabs to converge the magenta and green lines.
6. Apply paint to fix six magnets.
(As to models equipped with a magnet locking ring, tighten it.)
7. Remove the wedge installed temporarily on the yoke.
8. Tilting the angle of the yoke up, down and sideways, and adjust the yoke so as to obtain the circumference convergence. (Fig. B-8, 9)
9. Insert wedges to the position as shown in Fig. B-10 to obtain the best circumference convergence.
10. Wedge has a backing of double sided adhesive tape. Therefore, tear off one side of adhesive tape, and fix the wedges.
11. White balance adjustment (Black & White tracking) can now be performed.

WHITE BALANCE ADJUSTMENT

(Black and White Tracking)

1. Display a monochrome pattern.
2. Set the RED and GREEN DRIVE VRs for their mechanical center.
3. Turn the RED, GREEN and BLUE CUT-OFF VRs and the SCREEN VR fully counterclockwise.
4. Display a horizontal line. (Select the CUT-OFF SERVICE SWITCH from N to S and a HORIZONTAL LINE will appear.)
5. Turn SCREEN VR slowly clockwise until a very faint horizontal line appears.
6. Turn the CUT-OFF VR of the color which has appeared first, clockwise by about 10° and then adjust the SCREEN VR again so that the color may shine faintly.
7. Turn the other color CUT-OFF VRs slowly clockwise until a reasonable white line appears.
8. Return the monochrome pattern. (When returning a monochrome pattern select the CUT-OFF SERVICE SWITCH from S to N and a monochrome pattern will appear.)
9. Adjust the RED and GREEN DRIVE VRs for best white highlights.

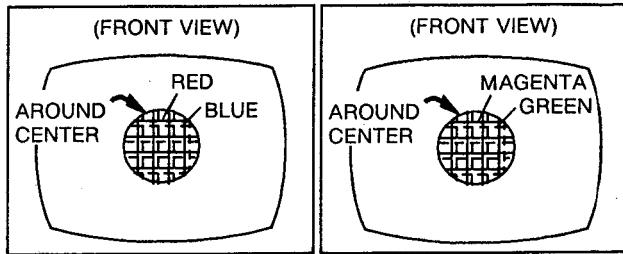


Fig.B-5

Fig.B-6

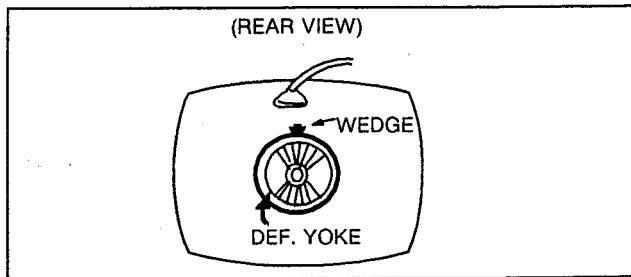
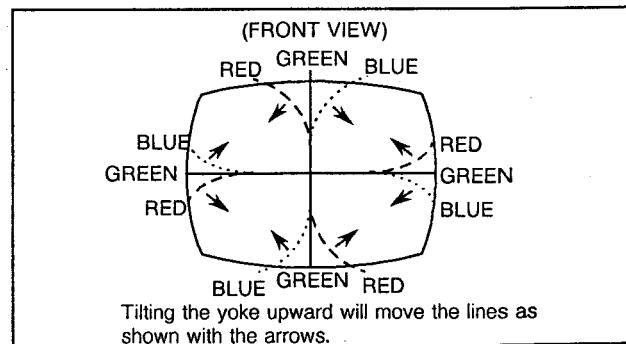
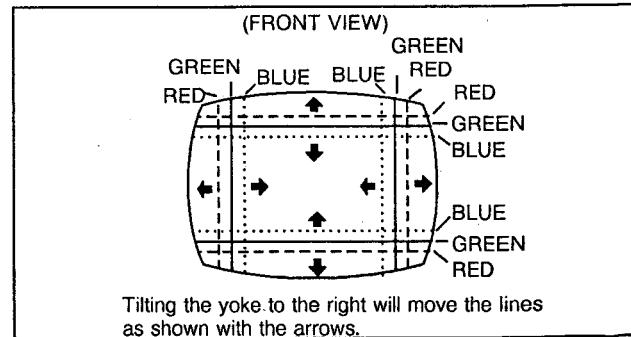


Fig.B-7



Tilting the yoke upward will move the lines as shown with the arrows.

Fig.B-8



Tilting the yoke to the right will move the lines as shown with the arrows.

Fig.B-9

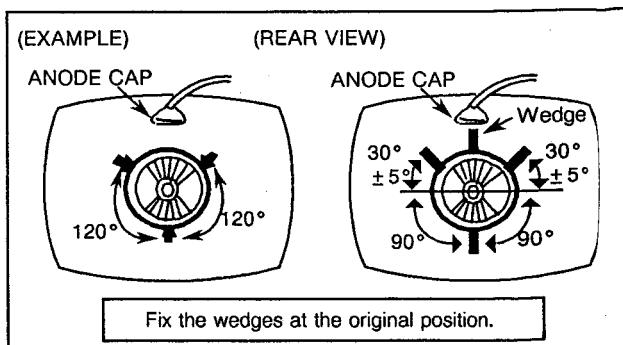


Fig.B-10

PARTS LIST

CAUTION

- The parts marked  are very important for the safety. When replacing these parts, be sure to use specified ones to secure the safety and performance.
- The module circuit board is supplied together with the assembly, but the parts which do not have the drawing in this Parts List, P. C. Board Ass'y and the Parts No. columns of which are filled with lines —, will not be supplied.
- As a rule, the resistors and capacitors which are indicated as shown in (NOTE 2) "HOW TO EXPRESS PARTS NUMBERS OF STANDARD PARTS" are not shown in the list of the parts on the board.
When ordering the service parts, confirm the resistance/rated power, capacitance/rated voltage, and type of the parts, then order by the part No. indicated according to (NOTE 2).

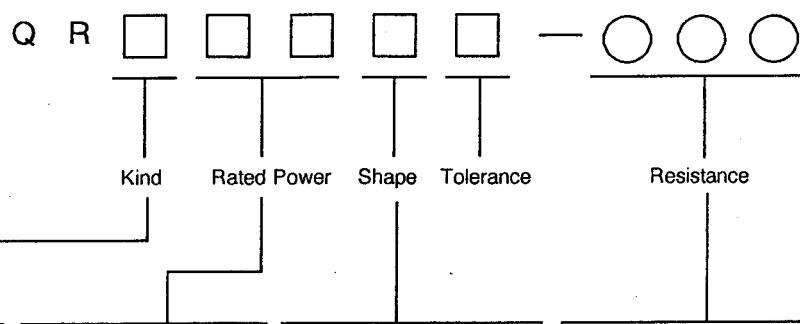
(NOTE 1) ABBREVIATIONS OF RESISTORS, CAPACITORS AND TOLERANCES

RESISTORS		CAPACITORS	
C R	Carbon Resistor	C CAP.	Ceramic Capacitor
F R	Fusible Resistor	E CAP.	Electrolytic Capacitor
P R	Plate Resistor	M CAP.	Mylar Capacitor
V R	Variable Resistor	HV CAP.	High Voltage Capacitor
HV R	High Voltage Resistor	MF CAP.	Metalized Film Capacitor
MF R	Metal Film Resistor	MM CAP.	Metalized Mylar Capacitor
MG R	Metal Glazed Resistor	MP CAP.	Metalized Polystyrol Capacitor
MP R	Metal Plate Resistor	PP CAP.	Polypropylene Capacitor
OM R	Metal Oxide Film Resistor	PS CAP.	Polystyrol Capacitor
CMF R	Coating Metal Film Resistor	TF CAP.	Thin Film Capacitor
UNF R	Non-Flammable Resistor	MPP CAP.	Metalized Polypropylene Capacitor
CH V R	Chip Variable Resistor	TAN. CAP.	Tantalum Capacitor
CH MG R	Chip Metal Glazed Resistor	CH C CAP.	Chip Ceramic Capacitor
COMP. R	Composition Resistor	BP E CAP.	Bi-Polar Electrolytic Capacitor
LPTC R	Linear Positive Temperature Coefficient Resistor	CH AL E CAP.	Chip Aluminum Electrolytic Capacitor
		CH AL BP CAP.	Chip Aluminum Bi-Polar Capacitor
		CH TAN. E CAP.	Chip Tantalum Electrolytic Capacitor
		CH AL BP E CAP.	Chip Tantalum Bi-Polar Electrolytic Capacitor

TOLERANCES									
F	G	J	K	M	N	R	H	Z	P
± 1%	± 2%	± 5%	± 10%	± 20%	± 30%	+ 30% - 10%	+ 50% - 10%	+ 80% - 20%	+ 10% - 10%

(NOTE 2) HOW TO EXPRESS PARTS NUMBERS OF STANDARD PARTS

■ RESISTOR



Symbol	Part Name
C	COMP.R
D	C R
S	CH MG R

Symbol	Rated Power
0 1	1 w
1 2	1/2 w
1 4	1/4 w
1 6	1/6 w
1 8	1/8 w

Symbol	Shape
1	Straight lead
8	Chip

Indicate with first two-figure expressed by Ω and following 0.
please note that, in case of resistance less than 10Ω , a letter "R" will be effective as point.

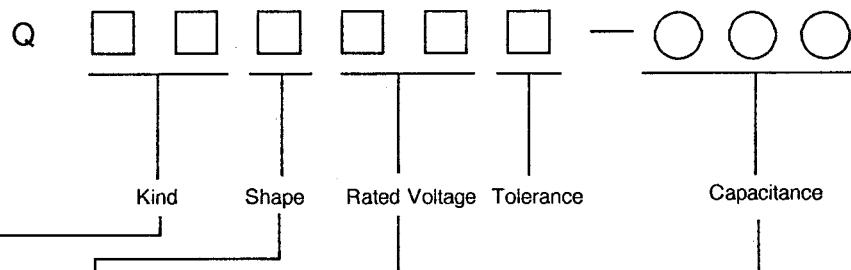
EX.

$$2.2 \Omega = 2R2$$

$$470 \Omega = 47 \times 10^1 \rightarrow 471$$

$$150k\Omega = 15 \times 10^4 \rightarrow 154$$

■ CAPACITOR



Symbol	Part Name
CS	C CAP.
CS	CH C CAP.
ET	E CAP.
FM	M CAP.

6Figure	5Figure		
	0	1	2
A		10V	100V
C		16V	160V
D			200V
E		25V	250V
H		50V	500V
J	6.3V	63V	
V		35V	

Indicate with first two-figure expressed by μF and following 0.

Please note that, in case of capacitance less than $10 \mu F$ a letter "R" will be effective as point.

EX

$$5pF = 5R0$$

$$1000pF = 10 \times 10^2 \rightarrow 102$$

$$47\mu F = 47 \times 10^6 \rightarrow 476$$

Symbol	Shape
1	Straight lead
1	Leads in the same direction
8	Chip
A	Leads in the same direction (compact part)

MAIN PARTS LIST

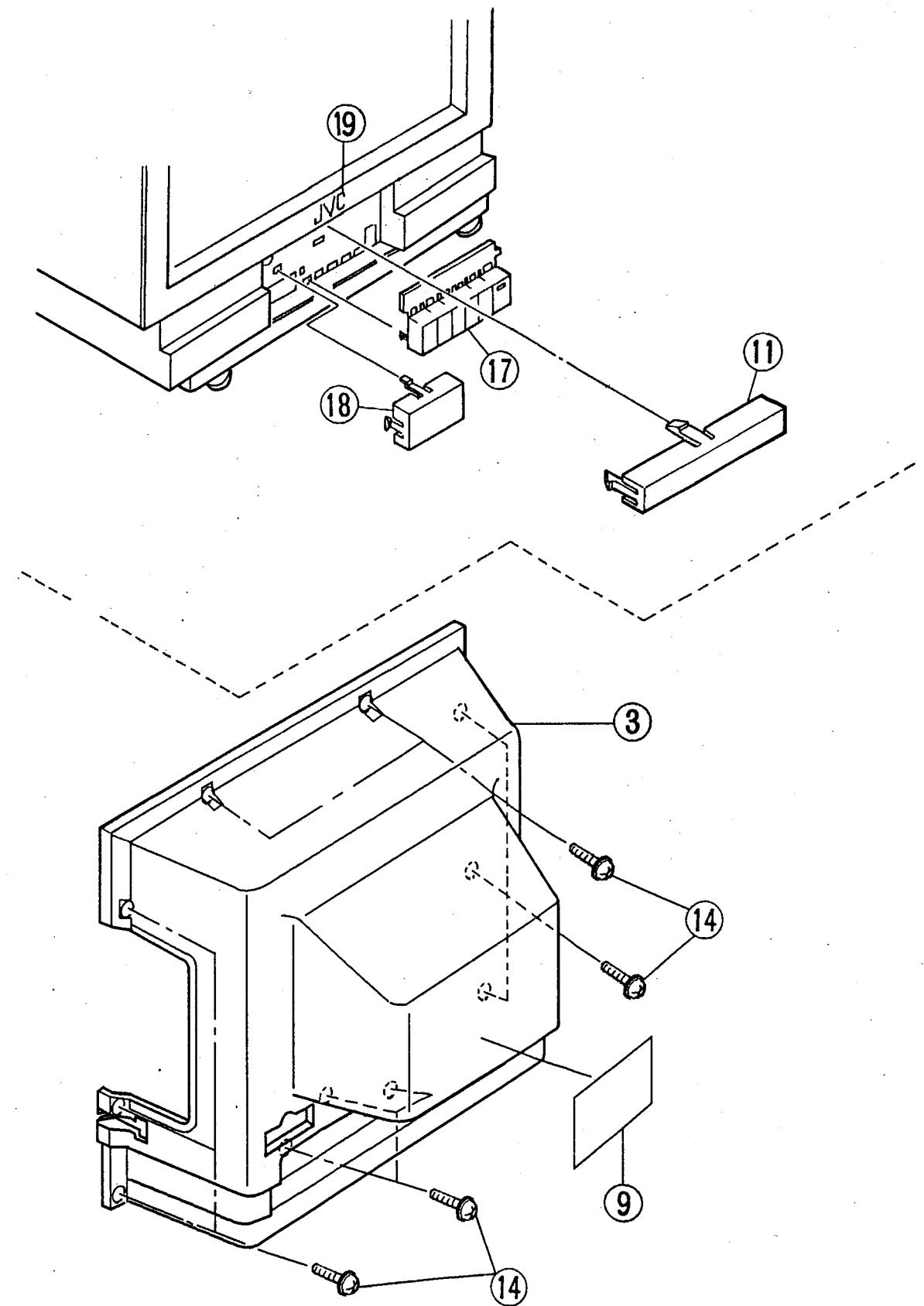
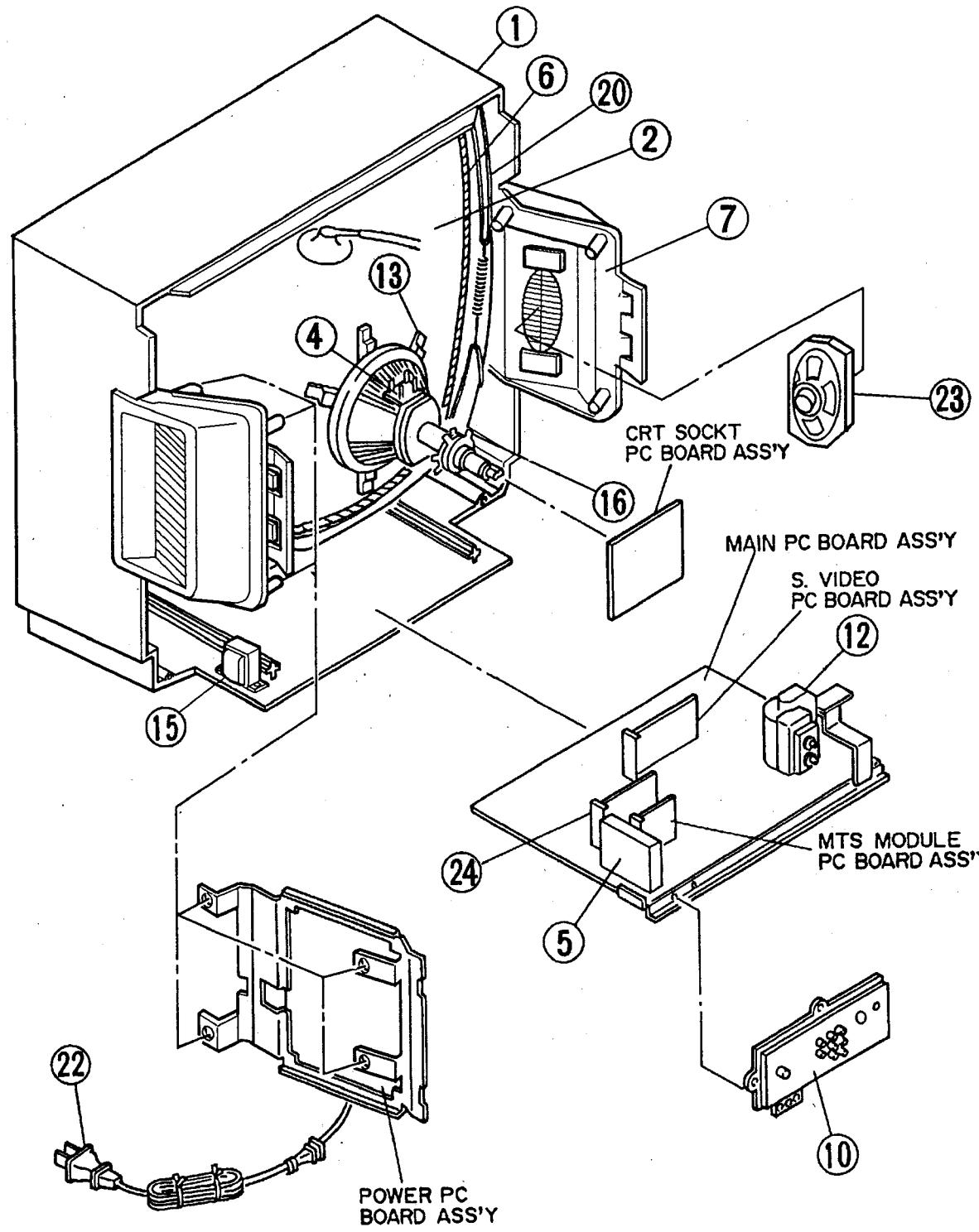
SYMBOL NO.	△	PART NO.	PART NAME	REMARKS	
CRT & TUNER	△	A75034-B CE41596-00AJ1 CE20106-B0AKJ1 CE41329-00BJ2 AN3181EL-A05 MVA66AAM03X	P&C MAGNET WEDGE ASSY DEF YOKE DEG COIL TUNER PICTURE TUBE	(x4) DY01 L01 TU1701 V01	*
VARIABLE R		QVPE610-203H QVPE610-202H QVPE610-103H QVPE610-102H QVPE610-103H	V. R (NOISE) V. R (BRIGHT) V. R (PICTURE) V. R (V. HEIGHT) V. R (SEPA)	20kΩ B 2kΩ B 10kΩ B 1kΩ B 10kΩ B	
R1112 R1246 R1249 R1428 R1606		QVPA803-502M QVPA803-502M QVPA803-502M QVPA803-201M QVPA803-201M	V. R (B. CUT OFF) V. R (G. CUT OFF) V. R (R. CUT OFF) V. R (G. DRIVE) V. R (R. DRIVE)	5kΩ B 5kΩ B 5kΩ B 200 Ω B 200 Ω B	
R3104 R3105 R3106 R3111 R3112		QVPA802-501M	V. R (PHASE)	500 Ω B	
R7272					
TRANSFORMER	△	CE30124-002 CE40361-00E CE41236-00B-KD	POWER TRANSF. H. DRIVE TRANSF H. V. TRANSF.	T1522	*
DIODE					
D1201 D1203 D1501 D1502 D1503		RD7.5ES (B3) -Y MA4150 (L) -Y MA4068 (M) -Y MA4091 (M) -Y MA4068 (N) V1-Y	ZENER DIODE ZENER DIODE ZENER DIODE ZENER DIODE ZENER DIODE		
D1601 D1715 D1717 D1794 D1851		MA4100 (M) -Y GL-5HD23 MA4330 (M) -Y MA4062 (M) -Y MA4120 (M)	ZENER DIODE L. E. D. ZENER DIODE ZENER DIODE ZENER DIODE		POWER/ON TIMER
D1852 D1924		MA4120 (M) -Y MA4130 (H) -Y	ZENER DIODE ZENER DIODE		
TRANSISTOR					
Q3101 Q3102 Q3103		2SC3271 (N, P) -L 2SC3271 (N, P) -L 2SC3271 (N, P) -L	SI. TRNSISITOR SI. TRNSISITOR SI. TRNSISITOR	B. OUT G. OUT R. OUT	
IC					
IC1201 IC1361 IC1421 IC1651 IC1681	△	TA8601BNV AN5352N UPC1498H TA7630P AN7168	I. C. I. C. I. C. I. C. I. C.		
IC1701 IC1702 IC1801 IC1831 IC1841		MN152121JMT3 MN1280-K TA78L005AP MN12C201D QH3091	I. C. I. C. I. C. I. C. IR DETECT UNIT		
IC1851 IC1852 IC7202 IC9901	△	M51320P M5218L BU4066B STR30130-A	I. C. I. C. I. C. I. C.	or MN4066B	

SYMBOL NO.	PART NO.	PART NAME	REMARKS
△ OTHERS	CM11157-00F-MA SFX-F004A CM11180-001-MA SGX-A001A-MU2 CM32825-00A-KD	FRONT CABI ASSY IF MODULE PB ASS REAR COVER MTS MODULE ANT. TERMINAL	*
△	CM21448-001-MA CM32864-A0A-KD QMP14C0-220J1	F GRILLE ASSY KNOB ASSY POWER CORD	*
CF1501 CF1701	CSB503F17 CSA4.00MS3	C. RESONATOR CELAMIC FILTER	*
DL1201 DL7202	CE40178-001 CE40907-A01	DELAY LINE 1H DELAY LINE	
△ F1961	QMF53U1-2R0S	FUSE	2.0A
△ F9901	QMF66U1-5R0S	FUSE	5.0A
△ F9902	QMF53U1-1R25S	FUSE	1.25A
△ LF9901 △ RY9901	CE40247-00A CESK002-001 CEBSN12D-01KJ3	LINE FILTER RELAY SPEAKER	SP01, 02 (x2)
S1201 S1701	QSL4A13-C02 QSP4H11-C03	LEVER SWITCH PUSH SWITCH	SERVICE SW FUNCTION
S1702 S1703 S1704 S1705 S1706	QSP4H11-C03 QSP4H11-C03 QSP4H11-C03 QSP4H11-C03 QSP4H11-C03	PUSH SWITCH PUSH SWITCH PUSH SWITCH PUSH SWITCH PUSH SWITCH	CH/LEVEL DOWN CH/LEVEL UP POWER VOL △ VOL ▽
△ TH9901 X1301	CE40595-001 A76351-D	TH POSISTOR CRYSTAL	or CE40595-001T

EXPLODED VIEW PARTS LIST

SYMBOL NO.	PART NO.	PART NAME	REMARKS
△ 1	CM11157-00F-MA	FRONT CABI ASSY	*
2	MVA66AAM03X	PICTURE TUBE	*
3	CM11180-001-MA	REAR COVER	*
△ 4	CE20106-B0AKJ1	DEF YOKE	*
△ 5	AN3181EL-A05	TUNER	TU1701
△ 6	CE41329-00BJ2	DEG COIL	*
△ 7	CM11188-001-MA	SP GRILLE (L)	*
9	CM44889-001-A	RATING LABEL	*
△ 10	CM32825-00A-KD	ANT. TERMINAL	*
11	CM21448-001-MA	F GRILLE ASSY	*
△ 12	CE41236-00B-KD	H. V. TRANSF.	T1522
13	CE41596-00AJ1	WEDGE ASSY	(x4)
14	GBSB4016N	W TAP SCREW	(x11)
△ 15	CE30124-002	POWER TRANSF.	*
△ 16	A75034-B	P&C MAGNET	*
△ 17	CM32864-A0A-KD	KNOB ASSY	
18	CM32363-010-V0	REMOCON WINDOW	
19	CM43094-002	JVC MARK	
20	CH30336-00A	BRAIDED ASSY	
22	QMP14C0-220J1	POWER CORD	*
23	CEBSN12D-01KJ3	SPEAKER	SP01, 02 (x2)
24	SFX-F004A	IF MODULE PB ASS	

EXPLODE VIEW



PRINTED CIRCUIT BOARD PARTS LIST
MAIN PC BOARD Ass'y (SX-1215A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
VARIABLE R			
R1112	QVPE610-203H	V. R (NOISE)	20kΩ B
R1246	QVPE610-202H	V. R (BRIGHT)	2kΩ B
R1249	QVPE610-103H	V. R (PICTURE)	10kΩ B
R1428	QVPE610-102H	V. R (V. HEIGHT)	1kΩ B
R1606	QVPE610-103H	V. R (SEPA)	10kΩ B
RESISTOR			
R1507	CJ39622-00J	R BLOCK	
R1201	QRG019J-390S	OM R	39Ω 1W J
R1422	QRC121K-561Z	COMP. R	560Ω 1/2W K
R1426	QRX029J-1R8A	MF R	1.8Ω 2W J
R1508	QRD129J-4R7S	C R	4.7Ω 1/2W J
R1525	QRG029J-560A	OM R	56Ω 2W J
R1526	QRG029J-680A	OM R	68Ω 2W J
R1528	QRG019J-391S	OM R	390Ω 1W J
R1531	QRX029J-2R7A	MF R	2.7Ω 2W J
R1533	QRX039J-2R7A	MF R	2.7Ω 3W J
R1534	QRX039J-2R2A	MF R	2.2Ω 3W J
R1536	QRD149J-1R0S	C R	1Ω 1/4W J
R1538	QRX039J-3R3A	MF R	3.3Ω 3W J
R1541	QRD161J-393Y	C R	39kΩ 1/6W J
R1542	QRD161J-393Y	C R	39kΩ 1/6W J
R1604	QRD161J-331Y	C R	330Ω 1/6W J
R1793	QRD141J-271SY	C R	270Ω 1/4W J
R1796	QRD121J-683SY	C R	68kΩ 1/2W J
R1921	QRG029J-102A	OM R	1kΩ 2W J
R1925	QRG019J-101S	OM R	100Ω 1W J
R1929	QRD121J-680SY	C R	68Ω 1/2W J
R1999	QRC121K-275EZ	COMP. R	2.7MΩ 1/2W K
CAPACITOR			
C1229	QEN61HM-225Z	BP E CAP.	2.2μF 50V M
C1303	QEN61HM-475Z	BP E CAP.	4.7μF 50V M
C1307	QFV71HJ-563MZ	TF CAP.	0.056μF 50V J
C1401	QEM61HK-225MZ	E CAP.	2.2μF 50V K
C1422	QCS31HJ-331AZ	C CAP.	330pF 50V J
C1426	QFV71HJ-394MZ	TF CAP.	0.39μF 50V J
C1427	QFV71HJ-563MZ	TF CAP.	0.056μF 50V J
C1428	QCS31HJ-470AZ	C CAP.	47pF 50V J
C1429	QFV71HJ-273MZ	TF CAP.	0.027μF 50V J
C1508	QETC1VM-107Z	E CAP.	100μF 35V M
C1524	QFZ0081-7201S	MPP CAP.	7200pF 1600V ±3%
C1525	QFZ0081-6201S	MPP CAP.	6200pF 1600V ±3%
C1526	QFZ0089-564S	MPP CAP.	0.56μF 1600V ±3%
C1530	QETB2CM-107	E CAP.	100μF 160V M
C1533	QETC1EM-477Z	E CAP.	470μF 25V M
C1534	QETB1VM-108	E CAP.	1000μF 35V M
C1536	QET52ER-106	E CAP.	10μF 250V R
C1540	QFV71HJ-224MZ	TF CAP.	0.22μF 50V J
C1542	QFM71HK-103MZ	M CAP.	0.01μF 50V K
C1654	QFV71HJ-124MZ	TF CAP.	0.12μF 50V J
C1659	QFV71HJ-124MZ	TF CAP.	0.12μF 50V J
C1684	QFV71HJ-683MZ	TF CAP.	0.068μF 50V J
C1687	QFV71HJ-683MZ	TF CAP.	0.068μF 50V J
C1690	QFV71HJ-104MZ	TF CAP.	0.1μF 50V J
C1691	QFV71HJ-104MZ	TF CAP.	0.1μF 50V J
C1709	QEB61HM-104MZ	E CAP.	0.1μF 50V M
C1808	QEM61EK-106MZ	E CAP.	10μF 25V K
C1810	QEM61EK-106MZ	E CAP.	10μF 25V K
C1856	QEN61CM-106Z	BP E CAP.	10μF 16V M

SYMBOL NO.	PART NO.	PART NAME	REMARKS
CAPACITOR			
C1857	QEN61CM-106Z	BP E CAP.	10μF 16V M
C1960	QET51VR-108	E CAP.	1000μF 35V R
C1961	QCF31HP-103AZ	CH C CAP.	0.01μF 50V P
C1962	QCF31HP-103AZ	CH C CAP.	0.01μF 50V P
C1963	QCF31HP-103AZ	CH C CAP.	0.01μF 50V P
C1998	QCZ9029-103M	C CAP.	0.01μFAC125V K
C1999	QCZ9029-103M	C CAP.	0.01μFAC125V K
TRANSFORMER			
T1301	CELT007-001	3.58 BP TRANS	
T1521	CE40361-00E	H. DRIVE TRANSF	
COIL			
L1201	A76186-47Z	PEAKING COIL	47μH
L1204	A76186-5.6Z	PEAKING COIL	5.6μH
L1302	A76186-2.2Z	PEAKING COIL	2.2μH
L1303	A76186-12Z	PEAKING COIL	12μH
L1521	A76186-56Z	PEAKING COIL	56μH
L1523	CE41124-00A	LIN COIL	
L1702	CE40041-220Z	PEAKING COIL	22μH
L1831	A76186-1.0Z	PEAKING COIL	1μH
DIODE			
D1201	RD7.5ES (B3) -Y	ZENER DIODE	
D1202	MA165-Y	SI. DIODE	
D1203	MA4150 (L) -Y	ZENER DIODE	
D1204	MA165-Y	SI. DIODE	
D1205	MA165-Y	SI. DIODE	
D1207	MA165-Y	SI. DIODE	
D1208	MA165-Y	SI. DIODE	
D1209	MA165-Y	SI. DIODE	
D1210	MA165-Y	SI. DIODE	
D1250	MA165-Y	SI. DIODE	
D1421	1SR35-100-Z	SI. DIODE	
D1501	MA4068 (M) -Y	ZENER DIODE	
D1502	MA4091 (M) -Y	ZENER DIODE	
D1503	MA4068 (N) V1-Y	ZENER DIODE	
D1504	ISS81-Y	SI. DIODE	
D1505	1N4003-Z	SI. DIODE	
D1521	RU4DS-LFK2	SI. DIODE	
D1522	MA165-Y	SI. DIODE	
D1531	1SR35-100-Z	SI. DIODE	
D1533	RU3AM-LFB1	SI. DIODE	
D1534	RGP10J-Z	SI. DIODE	
D1536	RH1S-Z	SI. DIODE	
D1540	1SS81-Y	SI. DIODE	
D1601	MA4100 (M) -Y	ZENER DIODE	
D1631	MA165	SI. DIODE	
D1632	MA165	SI. DIODE	
D1650	MA165-Y	SI. DIODE	
D1651	MA165-Y	SI. DIODE	
D1652	MA165-Y	SI. DIODE	
D1653	MA165-Y	SI. DIODE	
D1654	MA165-Y	SI. DIODE	
D1702	MA165-Y	SI. DIODE	
D1703	MA165-Y	SI. DIODE	
D1704	MA165-Y	SI. DIODE	
D1708	MA165-Y	SI. DIODE	
D1709	MA165-Y	SI. DIODE	
D1710	MA165-Y	SI. DIODE	

SYMBOL NO.	PART NO.	PART NAME	REMARKS
DIODE			
D1711	MA165-Y	S.I. DIODE	
D1715	GL-5HD23	L. E. D.	
D1717	MA4330 (M) -Y	ZENER DIODE	POWER/ON TIMER
D1721	MA165-Y	S.I. DIODE	
D1722	MA165-Y	S.I. DIODE	
D1723	MA165-Y	S.I. DIODE	
D1724	MA165-Y	S.I. DIODE	
D1725	MA165-Y	S.I. DIODE	
D1731	MA165-Y	S.I. DIODE	
D1732	MA165-Y	S.I. DIODE	
D1736	MA165-Y	S.I. DIODE	
D1737	MA165-Y	S.I. DIODE	
D1780	MA165-Y	S.I. DIODE	
D1781	MA165-Y	S.I. DIODE	
D1794	MA4062 (M) -Y	ZENER DIODE	
D1795	MA165-Y	S.I. DIODE	
D1796	MA165-Y	S.I. DIODE	
D1831	MA165-Y	S.I. DIODE	
D1851	MA4120 (M)	ZENER DIODE	
D1852	MA4120 (M) -Y	ZENER DIODE	
D1921	MA165-Y	S.I. DIODE	
D1922	MA165-Y	S.I. DIODE	
D1923	MA165-Y	S.I. DIODE	
D1924	MA4130 (H) -Y	ZENER DIODE	
D1925	1N4003-Z	S.I. DIODE	
△ D1961	W06A-Z	S.I. DIODE	
△ D1962	W06A-Z	S.I. DIODE	
△ D1963	W06A-Z	S.I. DIODE	
△ D1964	W06A-Z	S.I. DIODE	
TRANSISTOR			
Q1201	2SC2785 (J, H) -Y	S.I. TRANSISTOR	
Q1202	2SA1175 (J, H) -Y	S.I. TRANSISTOR	
Q1204	2SC2785 (J, H) -Y	S.I. TRANSISTOR	
Q1209	2SA1175 (J, H) -Y	S.I. TRANSISTOR	
Q1302	2SC2785 (J, H) -Y	S.I. TRANSISTOR	
Q1521	2SC2655 (Y) -Y	S.I. TRANSISTOR	
Q1522	2SD1427	S.I. TRANSISTOR	
Q1523	2SA1175 (J, H) -Y	S.I. TRANSISTOR	
△ Q1601	2SC1815 (GR) -Y	S.I. TRANSISTOR	
Q1621	2SC1815 (Y, GR)	S.I. TRANSISTOR	
Q1622	2SC1815 (Y, GR)	S.I. TRANSISTOR	
Q1635	2SC2785 (J, H) -Y	S.I. TRANSISTOR	
Q1636	2SA1015 (Y, GR)	S.I. TRANSISTOR	
Q1637	2SC1815 (Y, GR)	S.I. TRANSISTOR	
Q1651	2SC2785 (J, H) -Y	S.I. TRANSISTOR	
Q1652	2SC2785 (J, H) -Y	S.I. TRANSISTOR	
Q1653	2SC2785 (J, H) -Y	S.I. TRANSISTOR	
Q1701	2SC2785 (J, H) -Y	S.I. TRANSISTOR	
Q1702	2SC2785 (J, H) -Y	S.I. TRANSISTOR	
Q1705	2SC2785 (J, H) -Y	S.I. TRANSISTOR	
Q1707	2SA1175 (J, H) -Y	S.I. TRANSISTOR	
Q1708	2SA1175 (J, H) -Y	S.I. TRANSISTOR	
Q1712	2SC2785 (J, H) -Y	S.I. TRANSISTOR	
Q1780	2SC2785 (J, H) -Y	S.I. TRANSISTOR	
Q1781	2SC2785 (J, H) -Y	S.I. TRANSISTOR	
Q1782	2SC2785 (J, H) -Y	S.I. TRANSISTOR	
Q1791	2SC3619	S.I. TRANSISTOR	
Q1851	2SC2785 (J, H) -Y	S.I. TRANSISTOR	

SYMBOL NO.	PART NO.	PART NAME	REMARKS
TRANSISTOR			
Q1852	2SC2785 (J, H) -Y	S.I. TRANSISTOR	
Q1853	2SC2878 (B) -Y	S.I. TRANSISTER	
Q1854	2SC2878 (B) -Y	S.I. TRANSISTER	
Q1857	2SA1175 (J, H) -Y	S.I. TRANSISTOR	
Q1921	2SD1265 (Q, P)	S.I. TRANSISTOR	
△			
△			
Q1922	2SC2785 (J, H) -Y	S.I. TRANSISTOR	
Q1923	2SC2785 (J, H) -Y	S.I. TRANSISTOR	
Q1924	2SA1175 (J, H) -Y	S.I. TRANSISTOR	
Q1925	2SC1959 (Y) -Y	S.I. TRANSISTOR	
IC			
△			
IC1201	TA8601BNV	I. C.	
IC1361	AN5352N	I. C.	
△			
IC1421	UPC1498H	I. C.	
IC1651	TA7630P	I. C.	
IC1681	AN7168	I. C.	
IC1701	MN152121JMT3	I. C.	
IC1702	MN1280-K	I. C.	
IC1801	TA78L005AP	I. C.	
IC1831	MN12C201D	I. C.	
IC1841	QH3091	IR DETECT UNIT	
IC1851	M51320P	I. C.	
IC1852	M5218L	I. C.	
OTHERS			
△			
CF1501	SGX-A001A-MU2	MTS MODULE	
CF1701	CSB503F17	C. RESONATOR	
DL1201	CSA4.00MS3	CELAMIC FILTER	
F1961	CE40178-001	DELAY LINE	
	QMF53U1-2ROS	FUSE	2.0A
S1201	QSL4A13-C02	LEVER SWITCH	SERVICE SW
S1401	QSL4A13-C02	LEVER SWITCH	
S1701	QSP4H11-C03	PUSH SWITCH	FUNCTION
S1702	QSP4H11-C03	PUSH SWITCH	CH/LEVEL DOWN
S1703	QSP4H11-C03	PUSH SWITCH	CH/LEVEL UP
S1704	QSP4H11-C03	PUSH SWITCH	POWER
S1705	QSP4H11-C03	PUSH SWITCH	VOL △
S1706	QSP4H11-C03	PUSH SWITCH	VOL ▽
X1301	A76351-D	CRYSTAL	

CRT SOCKET PC BOARD Ass,y (SX-3052A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS		
VARIABLE R R3104	QVPA803-502M	V. R (B. CUT OFF)	5 kΩ	B	
R3105	QVPA803-502M	V. R (G. CUT OFF)	5 kΩ	B	
R3106	QVPA803-502M	V. R (R. CUT OFF)	5 kΩ	B	
R3111	QVPA803-201M	V. R (G. DRIVE)	200 Ω	B	
R3112	QVPA803-201M	V. R (R. DRIVE)	200 Ω	B	
RESISTOR R3113	QRG029J-123A	OM R	12 kΩ	2W	J
R3114	QRG029J-123A	OM R	12 kΩ	2W	J
R3115	QRG029J-123A	OM R	12 kΩ	2W	J
CAPACITOR C3107	QCZ0121-102M	C CAP.	1000 pF	3 kV	P
COIL L3101	QQL043K-181	PEAKING COIL	180 μH		
L3102	CE41055-470	CHOKE COIL			
TRANSISTOR Q3101	2SC3271 (N, P) -L	S.I. TRANSISTOR	B. OUT		
Q3102	2SC3271 (N, P) -L	S.I. TRANSISTOR	G. OUT		
Q3103	2SC3271 (N, P) -L	S.I. TRANSISTOR	R. OUT		
OTHERS	A75522-H	CRT SOCKET			

S VIDEO PC BOARD Ass,y (SX-7202A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS	
VARIABLE R R7272	QVPA802-501M	V. R (PHASE)	500 Ω	B
TRANSFORMER T7251	CE40176-001	DL P TRANSF.		
COIL L7202	A76186-272	PEAKING COIL	27 μH	
L7203	CE40041-5R6	PEAKING COIL	5.6 μH	
TRANSISTOR Q7205	2SC1815 (Y, GR) Y	S.I. TRANSISTOR		
Q7206	2SC1815 (Y, GR) Y	S.I. TRANSISTOR		
Q7207	2SC1815 (Y, GR) Y	S.I. TRANSISTOR		
Q7208	2SC1815 (Y, GR) Y	S.I. TRANSISTOR		
Q7211	2SC1815 (Y, GR) Y	S.I. TRANSISTOR		
Q7212	2SA1015 (Y, GR) L	S.I. TRANSISTOR		
Q7213	2SC1815 (Y, GR) Y	S.I. TRANSISTOR		
Q7214	2SC1815 (Y, GR) Y	S.I. TRANSISTOR		
Q7301	2SC1815 (Y, GR) Y	S.I. TRANSISTOR		
Q7311	2SC1815 (Y, GR) Y	S.I. TRANSISTOR		
Q7312	2SA1015 (Y, GR) Y	S.I. TRANSISTOR		
Q7861	2SC1815 (Y, GR) Y	S.I. TRANSISTOR		
Q7862	2SC1815 (Y, GR) Y	S.I. TRANSISTOR		
IC IC7202	BU4066B	I. C.	or MN4066B	
OTHERS DL7202	CE40907-A01	1H DELAY LINE		

POWER PC BOARD Ass'y (SX-9137A)

SYMBOL NO.	PART NO.	PART NAME	REMARKS
RESISTOR			
△ R 9901	QRF074K-1R8	UNF R	1. 8 Ω 7W K
△ R 9904	QRD122J-103S	C R	10 kΩ 1/2W J
△ R 9905	QRF154J-331	UNF R	330 Ω 15W J
△ R 9907	QRF054K-4R7	UNF R	4. 7 Ω 5W K
△ R 9909	QRF154J-331	UNF R	330 Ω 15W J
CAPACITOR			
△ C 9901	QCZ9034-472A	C CAP.	4700 pFAC125V P
△ C 9902	QCZ9034-472A	C CAP.	4700 pFAC125V P
△ C 9903	QCZ9034-472A	C CAP.	4700 pFAC125V P
△ C 9904	QEUT2DM-567M	E CAP.	560 μF 200V M
△ C 9907	QFZ9025-104M	MF CAP.	0. 1 μFAC125V M
△ C 9908	QFZ9025-104M	MF CAP.	0. 1 μFAC125V M
DIODE			
△ D 9901	1S1887A-Z	S.I. DIODE	
△ D 9902	1S1887A-Z	S.I. DIODE	
△ D 9903	1S1887A-Z	S.I. DIODE	
△ D 9904	1S1887A-Z	S.I. DIODE	
△ D 9905	1S1887A-Z	S.I. DIODE	
IC			
△ IC 9901	STR30130-A	I. C.	
OTHERS			
△ F 9901	QMF66U1-5R0S	FUSE	5. 0A
△ F 9902	QMF53U1-1R25S	FUSE	1. 25A
△ L F 9901	CE40247-00A	LINE FILTER	
△ R Y 9901	CESK002-001	RELAY	
△ TH 9901	CE40595-001	TH POSISTOR	or CE40595-001T

MODULE PC BOARD PARTS LIST

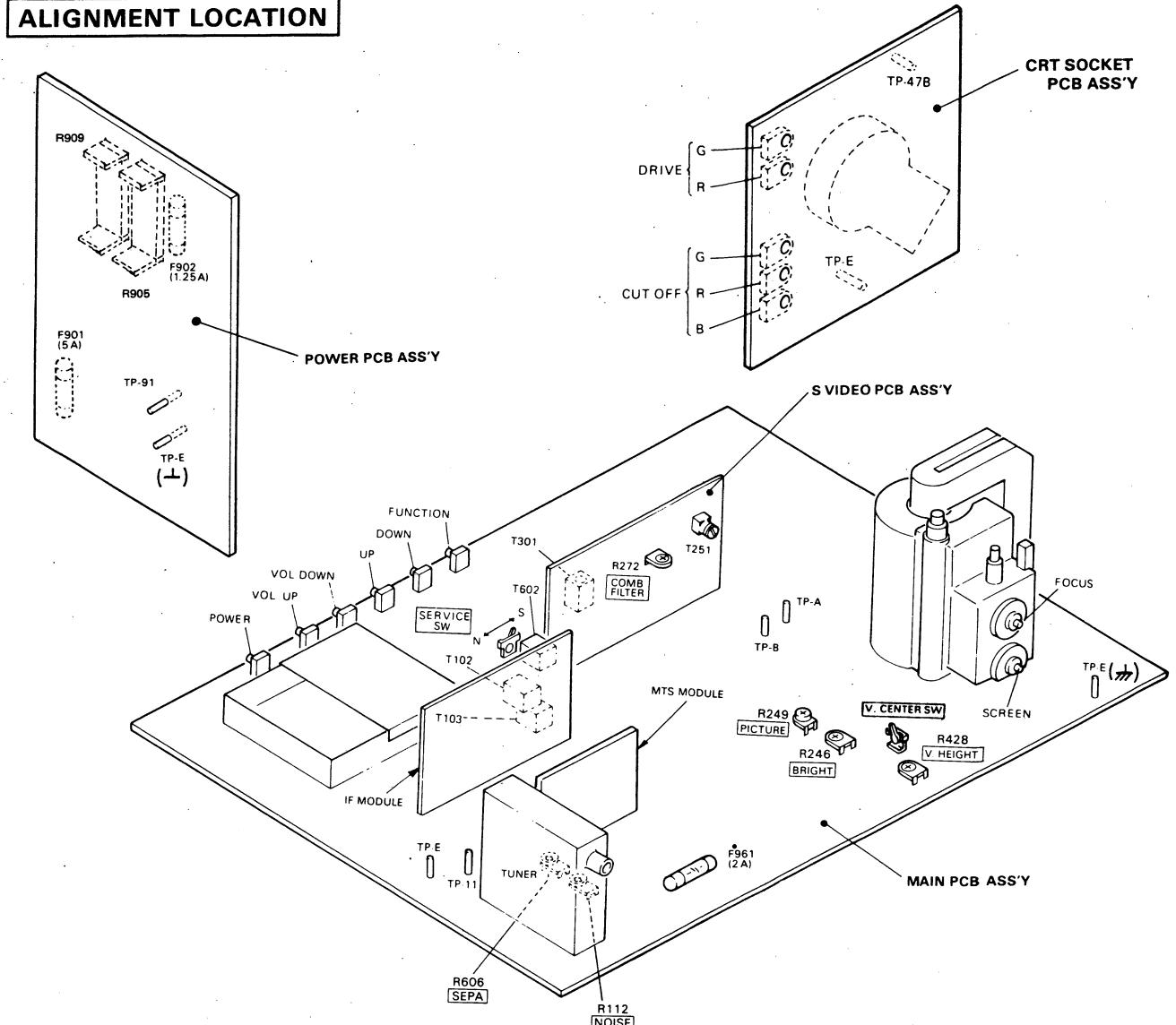
The following module pc boards are supplied as assemblies.

The component parts on the module PC boards are available only when the parts are listed in the "MODULE PRINTED CIRCUIT BOARD PARTS LIST"

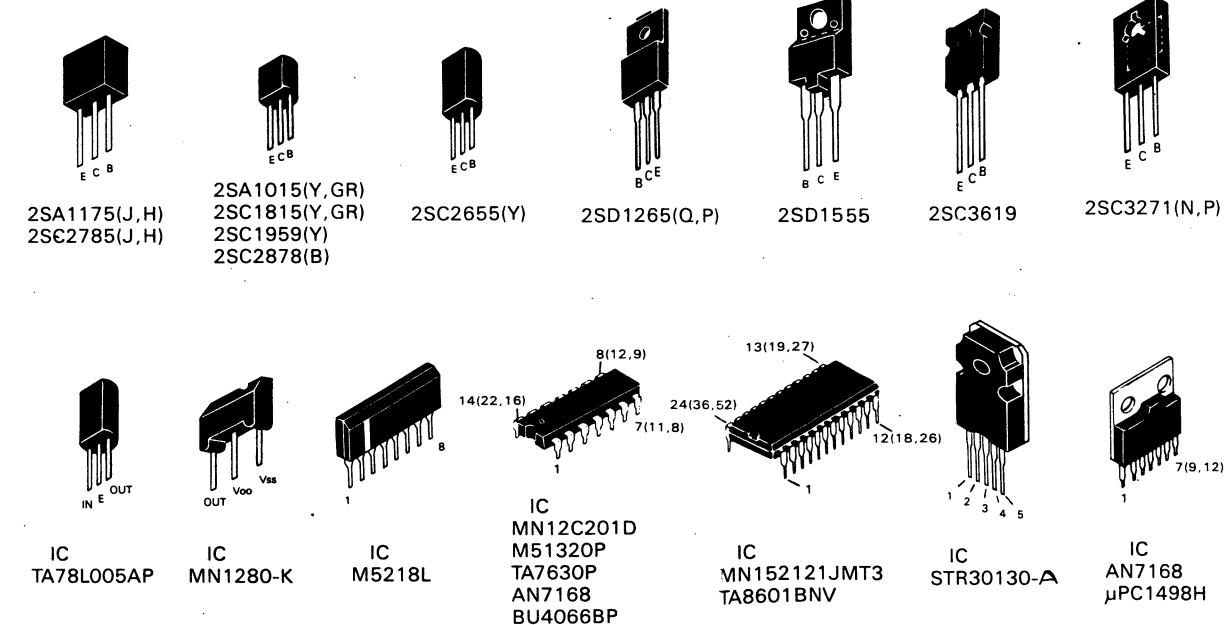
IF MODULE PC BOARD Ass'y (SFX-F004A)

MTS MODULE PC BOARD Ass'y (SGX-A001A-MU2) with in MAIN PC BOARD Ass'y

ALIGNMENT LOCATION



Basing of Transistor & ICs



NOTICE

The voltage reading and waveform are measured at each point with a multi-meter and an oscilloscope while receiving a service color bar signal with a sufficient sensitivity. The measurements were made with each VR under the condition just after the shipment. The figures of the signal circuits may be more or less different after adjustments, so use the figures simply for reference.

Multimeter used

DC 20kΩ/V

Given figures are all DC voltages.

Sweep speed of oscilloscope

H → 20 μS/div. V → 5 mS/div.

Others → sweep speed specified

Since the schematic diagram is a standard one, the circuit and circuit constants may be subject to change for improvement without any notice.

SAFETY

FR () denotes a fusible resistor which operates as a fuse. When replacing fusible resistors parts indicated with black shading () in the circuit diagrams, be sure to ensure safety by using designated parts.

As to other parts too, use designated parts to maintain safety and performance.

INDICATION OF PARTS SYMBOL

Inside board (Example) SX-1215A : R1209 → R209
Outside board (Example) R0001 → R01

SCHEMATIC DIAGRAM INDICATION

Resistor

- Resistance value
Without unit: [Ω] K : [kΩ] M : [MΩ]
- Rated allowable power
Without indication: 1/6W
Others Indicated
- Type
Without indication: Carbon resistor
OMR: Oxide metal film resistor
UNFR: Unflammable resistor
MFR: Metal film resistor
FR: Fusible resistor
• Composition resistor 1/2 [W] is indicated as 1/2S or Comp.

Capacitor

- Capacitance
Above 1 [pF]: Below 1 [μF]
- Withstand Voltage
Without indication: DC 50 [V]
• Others: DC withstand voltage [V]
AC indicated: AC withstand voltage [V]
- Indications for electrolytic capacitors are as follows.
(Example)
47/50 → capacitance [μF] / withstand voltage [V]
- Type
Without indication: Ceramic capacitor
MY: Mylar capacitor
MM: Metalized mylar capacitor
PP: Polypropylene capacitor
MPP: Metalized polypropylene capacitor
NP: Nonpolar electrolytic capacitor
BP: Bipolar electrolytic capacitor
TAN.: Tantalum capacitor

Coil
Without unit : [μH]

Power Supply

 : B1 (129.3 V)  : B2 (12 V)
 : Standby Voltage (5 V)

* Each voltage reading specified.

Connection method

 : Connector  : Receptacle
 : Wrapping or soldering

Test point & GND. symbol.

 : Test point by miniature GT pin
 : Only test point display
 : Live (Primary) side ground
 : Neutral (Secondary) side ground

DECODING CHIP PARTS CONSTANT TERMS

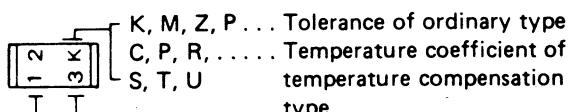
<CHIP METAL GLAZE RESISTOR>



Multiplier
Constant term

$$12 \times 10^3 = 12000 [\Omega] = 12 [k\Omega] \text{ (Resistance)}$$

<CHIP CERAMIC CAPACITOR>



K, M, Z, P... Tolerance of ordinary type
C, P, R, ..., S, T, U Temperature coefficient of
temperature compensation type

Multiplier
Constant term

$$12 \times 10^3 = 12000 [\mu F] = 0.012 [\mu F] \text{ (Capacitance)}$$

NOTE FOR SERVICE

This model's power circuit is partly different in the GND. The difference of the GND is shown by the LIVE (primary: ) side GND and the NEUTRAL (secondary: ) side GND.

Don't short between the LIVE side GND and NEUTRAL side GND or never measure with a measuring apparatus (oscilloscope etc.) the LIVE side GND and NEUTRAL side GND at the same time.

If above note will not be kept, a fuse or any parts will be broken.

SCHEMATIC DIAGRAM

AV-2649S
AV-2659S
AV-2659S

NOTE FOR SERVICE
This model's power circuit is partly different in the GND.
The difference of the GND is shown by the LIVE (primary: \perp) side GND and the NEUTRAL (secondary: \perp) side GND.
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NOTICE
■ (1) Diode: MA165-Y
■ (2) NPN Transistor: 2SC2785(I,J,H) or 2SC1815
■ (3) PNP Transistor: 2SA1175(I,J,H) or 2SA0105

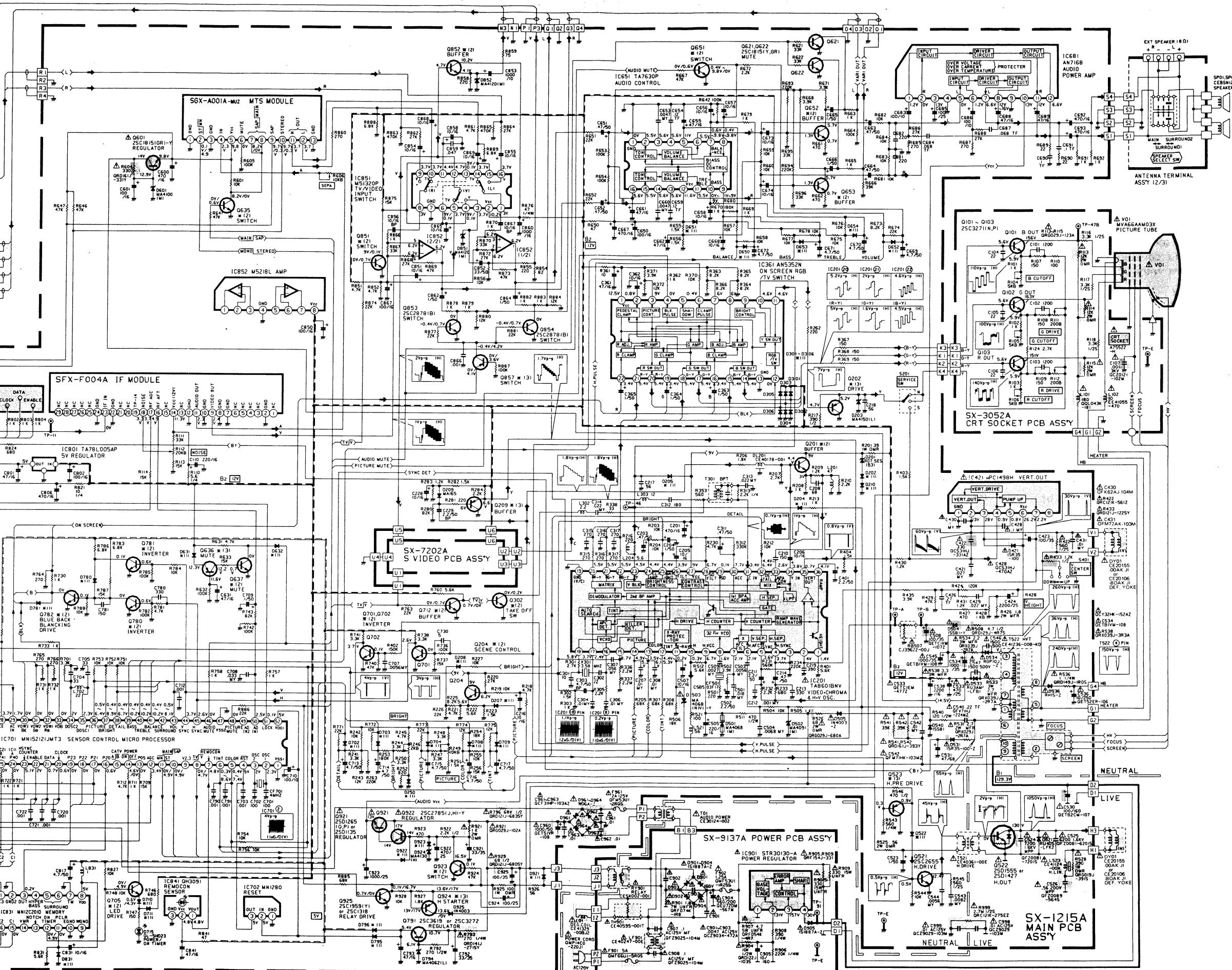
ANTENNA TERMINAL ASSY(1/3)
CM32825-00A-K0

■ (1) Diode: MA165-Y
■ (2) NPN Transistor: 2SC2785(I,J,H) or 2SC1815
■ (3) PNP Transistor: 2SA1175(I,J,H) or 2SA0105

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■ (2) NPN Transistor: 2SC2785(I,J,H) or 2SC1815
■ (3) PNP Transistor: 2SA1175(I,J,H) or 2SA0105



MAIN PCB BACK PATTERN

CK10788-B01
JVCS75V0

FRONT

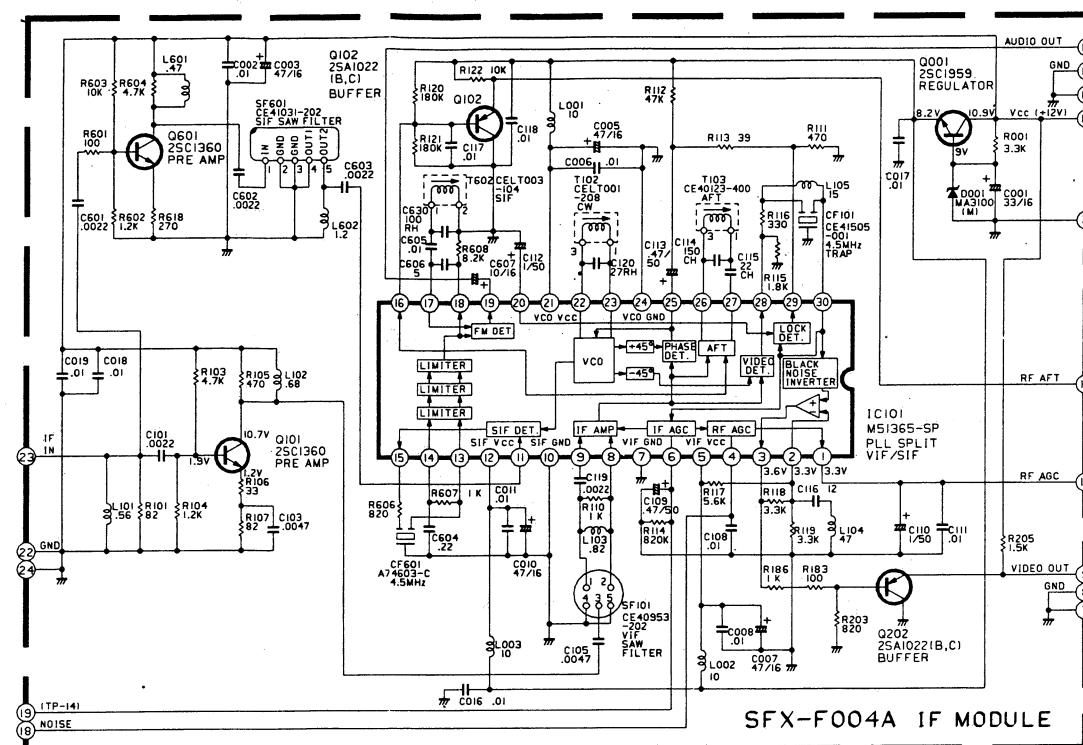
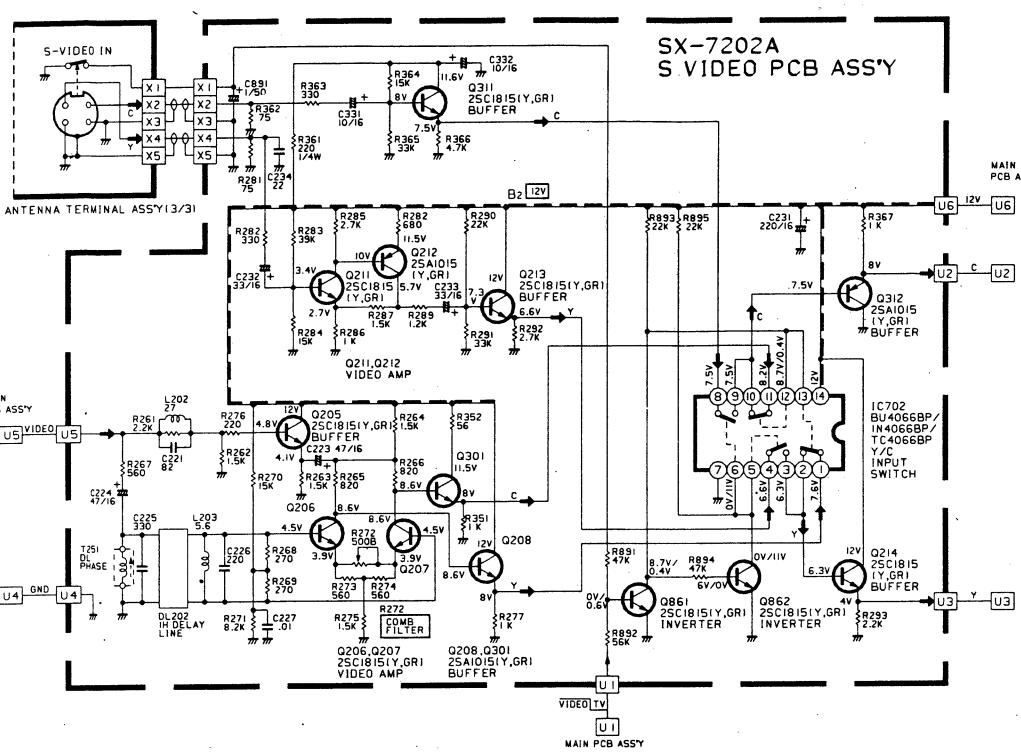
AV-2649S AV-2649S
AV-2659S AV-2659S

AV-2649S AV-2649S
AV-2659S AV-2659S

AV-2649S AV-2649S
AV-2659S AV-2659S

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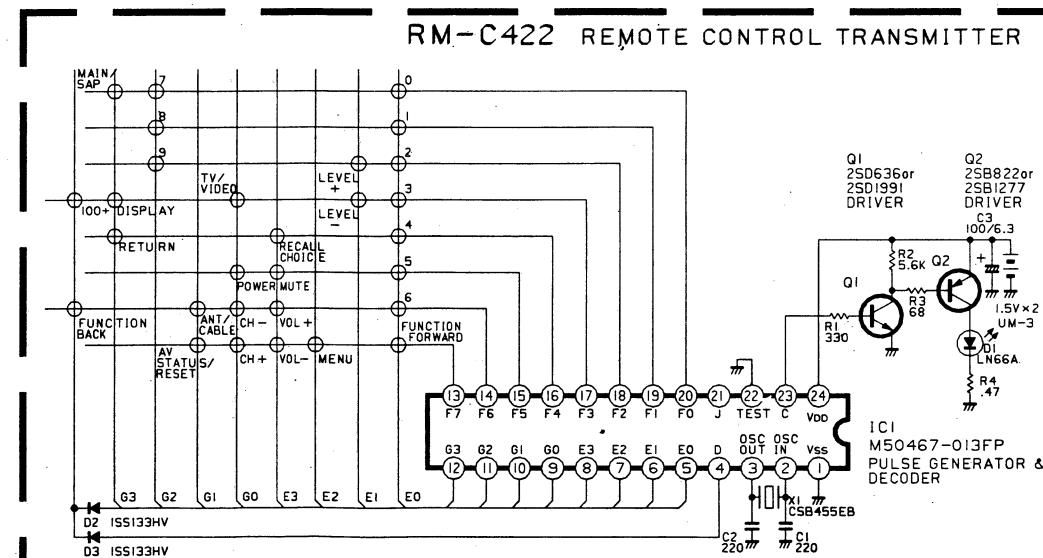
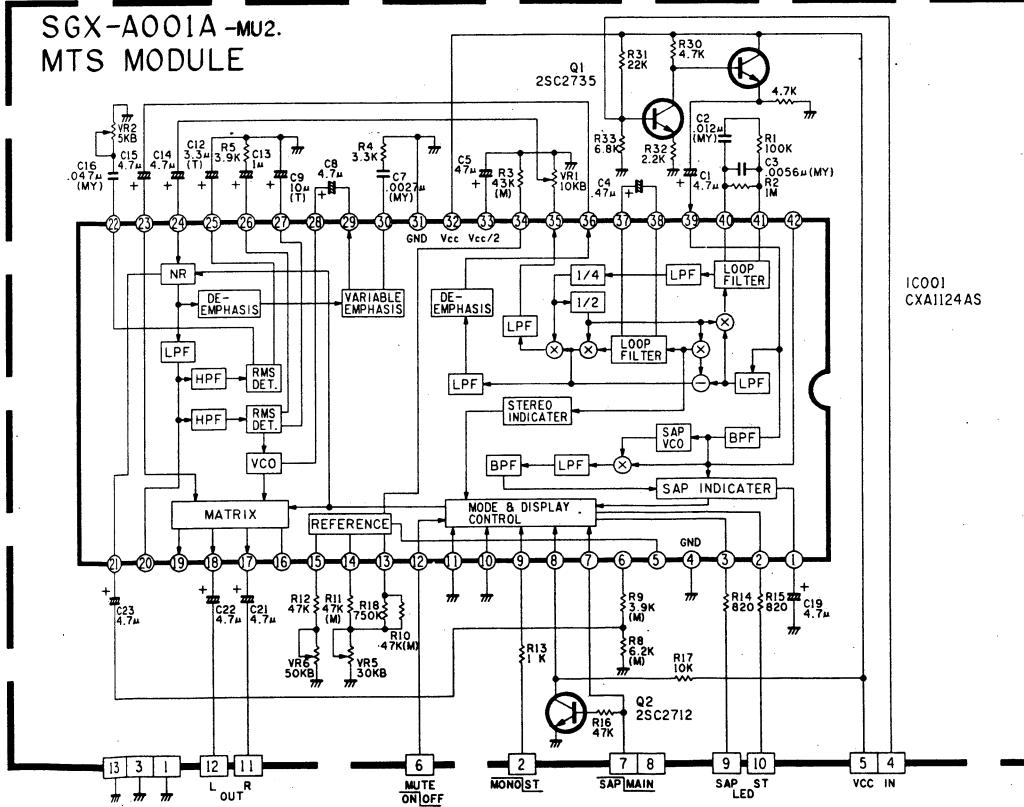
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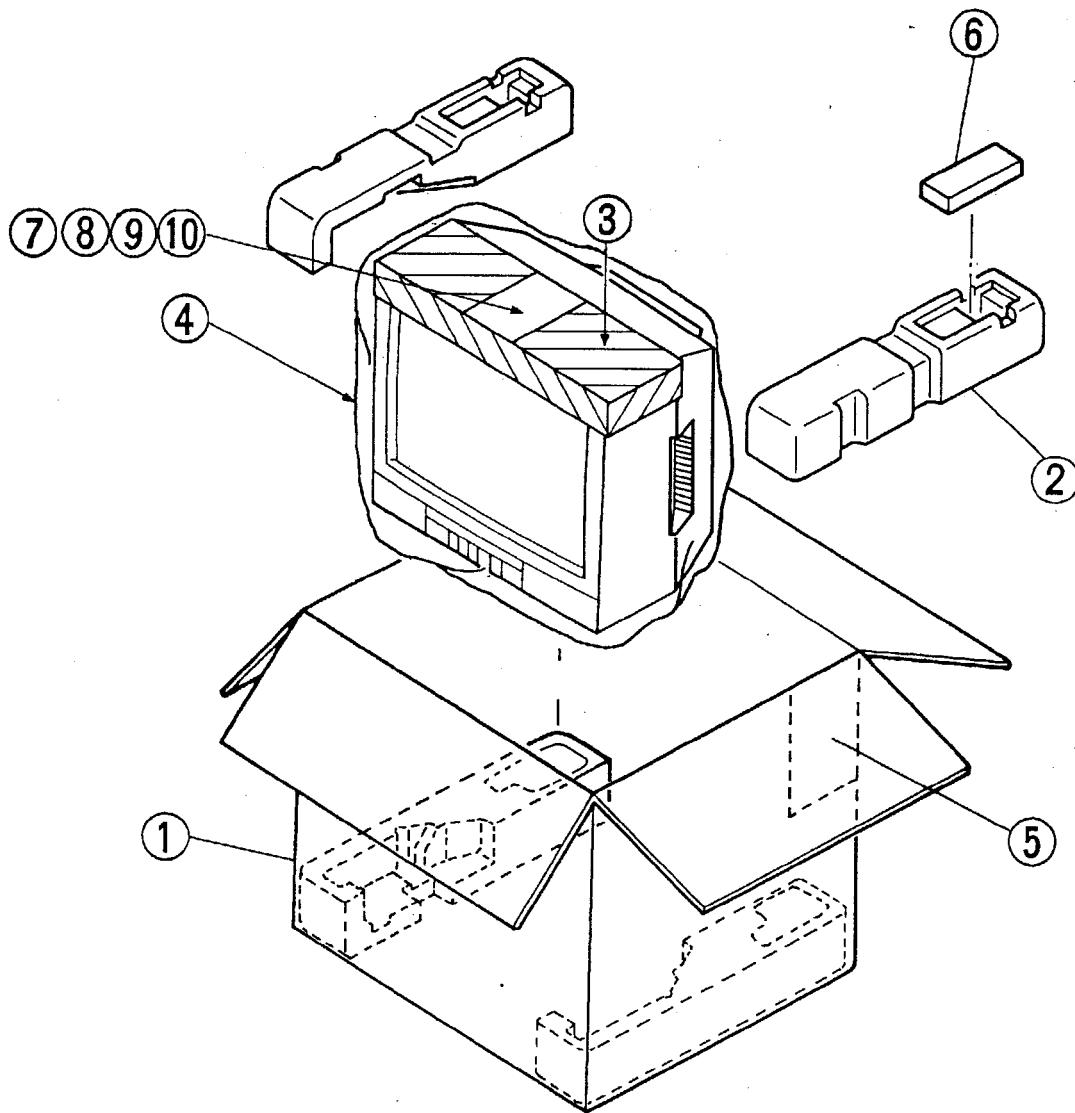
■ CHANNEL CHART

CHANNEL CAPACITY				CHANNEL CAPACITY			
MODE	CHANNEL	CHANNEL	TUNER	MODE	CHANNEL	CHANNEL	TUNER
T V	CATV	BAND	REAL	DISPLAY	BAND	REAL	DISPLAY
O O	VL		02		X O	W+35	71
			03			W+36	72
			04			W+37	73
			05			W+38	74
			06			W+39	75
	VH		07			W+40	76
			08			W+41	77
			09			W+42	78
			10			W+43	89
			11			W+44	80
X O	MID	A	14			W+45	81
		B	15			W+46	82
		C	16			W+47	83
		D	17			W+48	84
		E	18			W+49	85
	SUPER	F	19			W+50	86
		G	20			W+51	87
		H	21			W+52	88
		I	22			W+53	89
		J	23			W+54	90
X O	UL TRA	K	24			W+55	91
		L	25			W+56	92
		M	26			W+57	93
		N	27			W+58	94
		O	28			W+59	95
	HY PER	P	29			W+60	96
		Q	30			W+61	102
		R	31			W+62	103
		S	32			W+63	104
		T	33			W+64	105
X O	IV	U	34			W+65	106
		V	35			W+66	107
		W	36			W+67	108
		W+1	37			W+68	109
		W+2	38			W+69	110
	SUB MID	W+3	39			W+70	111
		W+4	40			W+71	112
		W+5	41			W+72	113
		W+6	42			W+73	114
		W+7	43			W+74	115
X O	IV	W+8	44			W+75	116
		W+9	45			W+76	117
		W+10	46			W+77	118
		W+11	47			W+78	119
		W+12	48			W+79	120
	UHF	W+13	49			W+80	121
		W+14	50			W+81	122
		W+15	51			W+82	123
		W+16	52			W+83	124
		W+17	53			W+84	125
X O	IV	W+18	54			A - 8	01
		W+19	55			A - 4	96
		W+20	56			A - 3	97
		W+21	57			A - 2	98
		W+22	58			A - 1	99
	UL TRA	W+23	59				
		W+24	60				
		W+25	61				
		W+26	62				
		W+27	63				
X O	IV	W+28	64				
		W+29	65				
		W+30	66				
		W+31	67				
		W+32	68				
	IV	W+33	69				
		W+34	70				

NOTE: TO RECEIVE THE SUBSCRIPTION OR PREMIUM PROGRAMMING FROM CERTAIN CABLE COMPANIES, SPECIAL ADAPTERS MAY BE REQUIRED.



PACKING



PACKING PARTS LIST

SYMBOL NO.	PART NO.	PART NAME	REMARKS
1	CP10726-015-A	PACKING CASE	*
2	CP10725-00A-A	CUSHION ASSY	*
3	CP30055-002-A	TOP COVER	*
4	CP30056-002-A	POLY. BAG	*
5	CM20926-00A-A	REC KEEPING CARD	*
6	RM-C422-KD	RC HAND PIECE	*
7	CM21229-A01	SAFETY TIPS	
8	BT-20108	SERVICE INF CARD	
9	BT-20113	WARRANTY CARD	
10	2649.59SUS-IBA	INST BOOK	

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West Coast	: 1011 West Artesia Blvd., Compton, California 90220	(213)537-6020
Southeast	: 3040 Northwoods Parkway, Norcross, Georgia 30071	(404)441-9244
Hawaii	: 1500 Kapiolani Blvd., Suite 105, Honolulu, Hawaii 96814	(808)944-9711

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